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COKE OVENS IN THE FRENCH GAS INDUSTRY

'THE carbonisation of coal for the manufacture of coke is considerably more ancient than its use for the manufacture of gas.' So Dr. G. E. Foxwell opens Section 4 of *King's Manual of Gas Manufacture*, and after reading that excellent section one is confirmed in the view that the coke oven is far more suited to the manufacture of coke than that of gas in which its performance is limited to a very little over 70 therms per ton even with coals which are better suited to retort practice. Mr. P. J. Savage, in a paper to the London and Southern Junior Gas Association, an abstract of which is published on later pages, describes the important installation he inspected at Villeneuve-la-Garenne in the environs of Paris. The coals carbonised are of the low-volatile coking type, French coals as low as 18 to 20% blended with richer German and American coals bringing the average up to 24%. With these coals 60-62 therms per ton was the gaseous yield at 520 B.Th.U. per cu. ft. The vogue of the coke oven in France is explained by two main factors, the demand for metallurgical coke for the steel industry and the relative shortage of gas-making coals in the indigenous deposits.

The ovens at Villeneuve are in five batteries of Koppers design and one of Becker, each containing 15 ovens each of 15 tons capacity. Both these types are described in Section 4 of *King's Manual of Gas Manufacture*. Mr. Savage's observation on the use of silica bricks in this installation and the arrangements made for their expansion is most interesting. The problem was the difference between the expansion of the silica of the ovens and their surrounding combustion flues and that of the siliceous material above and below them. The difficulty with all expansion spaces is the erratic and generally unpredictable way in which they close up, or fail to close up, as the temperature rises. Here at any rate, scurf coming to the rescue, there has been no considerable trouble. The use of the more expensive silica was justified by higher thermal yields —to what extent we are not told. The details of the battery equipment are well described.

Flexibility, the balancing of production against consumption, is effected by changing from producer gas to coal gas firing and by varying the carbonising period over a wide range. The first of these expedients may be justified where coke is the main product but it is to be hoped that it will not be too widely adopted in this country where gas-making coals will be mostly used and where gas is by far the more important product, important not only by reason if its monetary value but because of the overall policy of the gas industry. The ideal is that the coke oven should be confined to bed-rock base loads where this sort of expedient is not necessary.

The producers, of the Marischka type, are described in some detail. If we understand Mr. Savage correctly, the method of working the 12 units is one highly to be recommended. The coke fuel is classified in three grades—10-20, 20-30, and 30-50 mm. respectively—and each grade is fed separately to a definite number of units. This practice, which we have seen elsewhere, ensures that the best results are got out of each grade —for is it not a well-known fact that a producer gives its optimum results when the fuel is even in size, graded over a small range? There is an interesting observation about the air supply to the grates. The air-steam temperature is the usual 53° to 58°C., 'but the air was first passed through saturators supplied with warm water that had previously been used for cooling purposes in the coal gas primary condensers.' The result was a reduction in steam consumption to get the necessary blast temperature and a recovery of heat from the crude coal gas. The automatic control of producer operation is based upon the pressure drop from a point within the fire to a point in the gas space well above the coke level. This control was, apparently, directed to charging times; grate speed, or rather grate stopping and starting, was controlled by variations of temperature just

above the grate cap. A novelty in the cleaning of the producer gas, after a preliminary scrubbing, was the use of the Theisen exhauster, a machine which 'cleans the gas it pumps' in turbulent water jets ingeniously aranged relative to the impellor blades. Unfortunately power consumption per unit of gas pumped has been rather high but cleaning has been effective and satisfactory.

Mr. Savage describes the coal and coke handling plant. The former is, as is usual on the Continent, somewhat more complicated than is common in this country, but the complication is to some extent justified by the need for mixing and blending. And perhaps with coal at the equivalent of £6 plus per ton it may seem worth while spending quite a lot on handling it.

Labour conditions and methods of remuneration are national in character and, while lessons can be learned from foreign practice, methods are not easily transplanted from one soil to another. Mr. Savage notes that the French gasworker is paid on a scale which rises with length of service, increasing a little every year even though the man continues to do the same work until his retirement at the early age of 55—older working men may receive more than their younger foreman. Shortage of labour leads to elaboration of machinery and the wide application of automatic controls which appeared to Mr. Savage to be the most striking feature of the French gas industry.

RISING STEEL OUTPUT

UNITED KINGDOM steel production in the last month of 1952 was an all-time December record, being 7% higher than the record established in December, 1950, and indications are that steel output in 1953 will be 'more than ample to meet the requirements of all programmes at home' and will permit some increase in direct exports, even if there is some reduction in the amount of steel imported. Total production for the 53 weeks ended January 3 was 16,418,000 tons, compared with the previous record of 16,293,000 tons in 1950. The *Bulletin* of the British Iron and Steel Federation estimates that production this year should reach the industry's target figure of 17½ mill. tons. If allowance is made for the fact that 500,000 tons of the 1952 production has gone to increase producers' and users' stocks it is expected that supplies this year, if there is no change in imports, will be 2 mill. tons larger than in 1952.

These encouraging figures come only about two months after the issue of the third annual reports of the Gas Council and the area boards, all of which recorded that the gas industry had been frustrated in the implementation of its programmes by shortage of steel and other materials. The reports related to the year ended last March but included more recent figures indicating how far short the supplies of steel had fallen in relation to the needs of the industry. For the first quarter of 1952 the allocation to the gas industry was at the rate of 30,300 tons per quarter, which was 'much below the requirements of the boards.' For the second quarter it was the same; for the third it was reduced to 23,500 tons, which made impracticable the retention of any margin for priorities; and for the fourth quarter it was raised to 28,800 tons.

Restrictions on capital investment will continue to restrain the gas industry's plans, both for reconstruction of existing plants and for development of new undertakings, but it is good to know that the supplies of at any rate one of its major requirements appear to have overtaken limited demand. As Colonel Harold Smith reminded us at the Press conference on the occasion of the issue of the annual reports it takes about four years to build a new gasworks, so the full results of the improved steel situation will not be immediately apparent on the gas manufacturing side.

Figures quoted in the Federation *Bulletin* point to an increase of one-eighth in supplies during 1953, ignoring imports. It is improbable that home consumption can grow at the same pace, and it is unlikely that there will be a rise of one-eighth in home capital investment. The allocation scheme under the Iron and Steel Distribution Order, 1951, is still in operation. It must remain so for so long as supply and demand are out of balance, but the question is now being asked whether it need be continued. During 1952 the Gas Council assumed the task of apportioning to the area boards the tonnage of steel available to the nationalised industry, the area boards in turn authorising steel to their contractors. Subsequently, as a result of representations made by the Society of British Gas Industries, an arrangement was arrived at by which in addition the Gas Council made a small bulk allocation of steel direct to individual contracting firms to cover small orders and spares and repair parts. Both sides of the industry would welcome the removal of such restrictions and the unnecessary work which they involve.

CHANGE

WE very much like the paper which Mr. J. W. Dean, Manager of the Plymouth and North Cornwall Sub-Division of the South Western Gas Board, gave at a recent meeting of the South Western Section of the Institution of Gas Engineers (see later pages) because of the author's outspoken and courageous comments and the virility which they markedly express. What Mr. Dean had to say in the early part of his paper reminds us of the vivid remarks of the Chairman of the Gas Council seven months after vesting day and following a tour of inspection of the country's gasworks, large, medium, and small. Colonel Harold Smith in November, 1949, was shocked with what he had seen, not only in small undertakings. The condition of some undertakings was, he said, the result of sheer laziness. Discussing the general position at the end of the second world war, Mr. Dean, who does not wear rose-coloured spectacles, maintained that, with a number of honourable exceptions, 'out-dated policy, stick-in-the-mud management, and complacency were rife.' And he added: 'Those of us who have been charged with the task of bolstering-up decaying undertakings until such time as assured supplies of gas arrive in bulk, or, if the works are to be retained, until rebuilding is complete, know all too well that nationalisation

has meant re-birth to many.' What little attention was paid to so many tired and worn-out geese which had laid golden eggs.

Though there are facets in the metamorphosis brought about by nationalisation which are unpalatable, there is already plenty of evidence that the smaller units have in many cases been raised in efficiency with a concomitant reduction in cost of gas into holder. Wise spending does effect economies; 'make-do and mend' is not an answer to satisfactory gas service. And how right Mr. Dean is in his insistence that the combination of cleanliness and efficiency has produced a crop of revitalised gasworks. The future is bright if we tackle the work ahead with animation and imagination; if, without destroying helpful criticism, we can achieve more unity within the industry; if we organise and employ to the full a live, energetic, enthusiastic, selling force; if, convinced of the possibilities of the gas industry, we translate our convictions into everyday practice; if we retain a spirit of adventure; and if, finally, we try to cease looking back and look forward. The tradition of the gas industry is, willy-nilly nationalisation, not to be sneezed at, even in current foggy gloom. Let us enhance tradition as we go along—and let us be frank with ourselves and with all our associates, for we must not become merely masters of mesmerising ourselves, satiated in self-sufficiency.

ELECTRICITY VIA THE ATOM

THE QUESTION of when electricity will be produced from nuclear energy and made available to the consuming public occurs now—and quite naturally—not infrequently. In our 'Parliamentary Notes' on a later page we summarise the debate on the subject in the House of Commons on January 26, during which the Minister of Supply spoke about the possibilities of graphite piles, heavy water reactors, and natural uranium reactors yielding plutonium as a by-product—these apart from 'breeder-reactors' designed to produce more fissile material than they consume. Work is proceeding on the design and development of a full-scale 'breeder-reactor' capable of producing substantial amounts of electricity. Mr. Sandys said that there was no reason why nuclear reactors should not before long provide a useful additional source of power. It is not to be imagined that nuclear reactors will in the near future supersede existing methods of producing electric power. There is, of course, a very real gap between technical possibility and economic practicability. Equally obvious is the inference that we are on the fringe of power-production potentialities from atom-smashing which may eventually affect the outlook of the gas industry. The debate on nuclear fission is a reminder that the type of age we are enduring is not one conducive to smugness.

A DYING INDUSTRY?

DISCUSSING in a recent issue of the *Financial Times* earlier correspondence on the subject of power from uranium, Mr. C. R. Wilkin, Deputy Chief Engineer to the Manchester undertaking of the North Western Gas Board, commented that we are prone to think that abundant coal for export would place us shortly on the road to prosperity, but it may well be that atomic energy developments in Europe and elsewhere will forestall the need for British coal—nor can any attempted control prevent such a contingency. On the contrary, any effort to retard development can only result in the coal-using European nations intensifying their efforts to reach power independence.

The long cherished ideal in this country that British coal should, in fact, be the basis of chemical production rather than be used as a fuel becomes, as the years pass, less attractive, for already the oil industry, by its rapid development of catalytic cracking plants, has shown that such chemicals and by-products can be obtained in higher purity and more economically than by the distillation of coal. Mr. Wilkin emphasised that every increase in the price of coal today, whether it be due to production, transport, or proposed tax, can only hasten the day when coal ceases to be a 'black diamond' and takes its place alongside other industries which have come and gone. It is to be hoped that those who seek to increase the price of coal will take this to heart.

IN AND ON THE AIR

BROADCAST 'IMPROMPTUS' are well recognised as being the result of careful rehearsal and very often of recording. There have been exceptions; occasionally there has been escape from B.B.C. rigidity of word control—as, for example, the famous saying in 1936 that the Fleet was lit up. In a recent broadcast programme in the Welsh Home Service Mr. R. S. Snelling, Deputy Chairman of the Wales Gas Board, in no way went off the rails. No doubt with his tongue in his cheek he dismissed with pinches of salt a lady consumer's complaint that gas pressures fluctuated in Wales. Mr. Snelling did not deny that low pressures were experienced, but he claimed that they were isolated. If isolation in this respect applies to Wales that country is indeed to be envied. From our experience, fluctuation in pressure is not at all infrequent in England and Scotland, and we know that in some cases pressures are deliberately lowered at the source to effect reduction in gas consumption and to ease the burden of the gas suppliers. It would appear from the comments of Mr. Snelling on the air that Wales holds aloof from such malpractices. The question posed in the programme was 'How Right is the Consumer?' The pith of Mr. Snelling's suggestions regarding this was that, as far as the Wales Gas Board is concerned, the legitimate rights of the consumer are being safeguarded as speedily as possible and with great determination on the part of the Board, which is coupling imagination with practical application in giving the consumer better and better service and is by no means neglecting the propositions put forward by consultative councils, which he described, in compliment or otherwise, as 'watchdogs.'

THE TEES-SIDE INDUSTRIAL DEVELOPMENT BOARD has reported that at the end of 1952 there were nearly 3,000 unemployed on Tees-side, an increase of 700 on the previous year, but lower than the figures in the intervening months. The Board expresses a cautious attitude about the future employment position and recognises the challenge that without greater productivity the industrial rewards for Tees-side may be less satisfying. Mr. J. C. H. Booth, who was re-elected President of the Board at its annual meeting, said that between 1945 and 1949, when restrictions on capital expenditure were imposed, extensions had been carried out to 33 existing industries on Tees-side and 20 new industries had been established. The process of diversifying should not be allowed to stop, especially as it was in this direction they had to look to take up any slack in employment which might occur from time to time. Tees-side had a number of natural advantages which made industrial expansion easier than in other parts of the north-east.

Personal

Mr. W. A. H. Keeley, Managing Director of the Montevideo Gas and Dry Dock Company, has resigned from the Board.

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Mr. D. T. Barritt, Mr. H. Clarke, and Mr. J. P. V. Woollam, three Directors of Simon-Carves, Ltd., have been appointed Joint Managing Directors of the company.

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Mr. H. H. Mardon, head of the plant engineering division of the British Iron and Steel Research Association, has been appointed Chief Project Engineer with Ashmore, Benson, Pease & Co., Stockton-on-Tees.

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Mr. James Hall, Manager of the Provan station of the Glasgow undertaking, has been appointed Divisional Production Engineer for the Glasgow division, and **Mr. J. A. Ferguson,** of F. A. Macdonald & Partners, Consulting Engineers, has been appointed Divisional Construction and Maintenance Engineer for the Glasgow division.

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Mr. A. H. Robson, Secretary and Accountant at Altrincham (North Western Gas Board) has retired after 46 years in the gas industry. To mark the occasion a presentation of smoker's requisites, suitably inscribed, was made on behalf of the staff by Mr. R. Bowden, District Service Manager. Mr. Robson began his service in the industry in August, 1906, with the South Shields Gas Company. He moved to Altrincham in 1928 when he was appointed Secretary and Accountant of the Altrincham Gas Company and held this position until his retirement.

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Mr. A. V. Mellor, of the Fylde group accountancy staff (North Western Gas Board) has retired after a half-century in public service. To commemorate his retirement, Mr. Mellor yas presented with a fireside chair subscribed for by the Fylde group staff and presented by Mr. J. G. O. Drake, General Manager of theg roup. Mr. Mellor was appointed Secretary and Accountant to the Fleetwood Gas Company in 1934, and in 1950 was transferred to the group accountancy section at Blackpool. Mr. Mellor's long and close association with Fleetwood was commemorated at another ceremony, held at the Fleetwood undertaking, where he received a pipe as a token of esteem from his former colleagues. Mr. W. Curran, a prepayment meter inspector, made the presentation.

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Dr. R. J. Morley has been appointed by the National Coal Board to be Director-General of Carbonisation in succession to **Mr. L. O'Connor,** who has left the Board's service. Dr. Morley, who is at present with Imperial Chemical Industries, Ltd., at Billingham, will take up his duties on March 16. He joined Imperial Chemical Industries, Ltd., at Billingham in 1935 and spent four years as a plant manager and in the research department. He went to Canada in 1940 and was for 18 months at Calgary, Alberta, advising on the design and management of a plant for making ammonia synthesis gas by the methane steam reaction process. He returned to Billingham in 1942 in the technical department, and was appointed ammonia technical manager in 1949. In this post he has been concerned with planning, process design, and plant running problems in connection with steam and electrical plant, coke ovens, gasification processes, and with a number of pressure and other chemical processes.

Obituary

Mr. Samuel P. Bowen, of Eaglescliffe, Darlington, Managing Director of Tar Distillers, Ltd., Stockton-on-Tees, has died at the age of 79.

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Mr. Arthur Stanley, who was a member of the staff of Simon-Carves, Ltd., for more than 53 years, has died at his home at Deganwy, North Wales. He was 87. He was the only surviving member of the personal staff of the late Mr. Henry Simon, the founder of the firm. He started work as an office boy in 1883 when the firm's headquarters were a little office in St. Peter's Square, Manchester. In 1896 he became secretary of the company, and was appointed a director four years later, and managing director in 1901. He retained this position until his retirement 35 years later, and then continued as a part-time director.

1953 'Journal' Directory

THE following changes have been notified during the past month. To keep the information in the 1953 edition of the *Gas Journal Calendar and Directory* up to date readers are invited to note these alterations (together with the appropriate adjustments relating thereto in the 'personnel' section of the *Directory*, pp. 141-156):

Page 25 and 59.—NORTH WESTERN: *Chairman* of Consultative Council and *ex officio member* of Board, Alderman (not Councillor) C. E. P. Stott, J.P.
„ 57.—COMMERCIAL DISTRICT: Delete R. W. Wood, *M.*, deceased.
„ 61 and 70.—SOUTH LANCASHIRE GROUP: S. Hopkinson, F.S.C., F.I.A.M.A., M.I.I.A. (not A.M.I.A.A.), *Group Sales and Service Manager.*
„ 64.—LYTHAM ST. ANNES: Delete J. H. Ranft, *Dist.Service M.*, deceased.
„ 73 and 76.—NORTHERN GAS BOARD, WESTERN GROUP: Add W. E. Nicholson, *Group Accountant.*
„ 91.—WESTON-SUPER-MARE SUB-DIVISION: *Address:* 32, The Boulevard, Weston-super-Mare.
„ 123 and 131.—LANARKSHIRE: Group redesignated as Lanarkshire Division; J. M. Dow, *Div. Controller.*
„ 130.—GLASGOW DIVISION: J. Hall, *Div. Production E.*; J. A. Ferguson, *Div. Constructional and Maintenance Engineer.*
„ 132.—NEILSTON: Delete I. Simpson, *Dist.M.*, removed.
„ 132 and 133.—RENFREWSHIRE AND GREENOCK: Now incorporated in a new Western Group; A. Jamieson, formerly *Group Manager,* Greenock, now becomes *Group Manager,* Western Group. Delete J. M. Dow, *Group Manager,* Renfrewshire, and *Dist.M.*, Paisley, removed.
„ 135.—NEWMILNS: I. Simpson, *Dist.M.*

Diary

Feb. 6.—Midland Section, I.G.E.: 'Oxide Purification in Towers,' R. J. Warr and E. T. Pickering (first presented at the annual meeting of the Institution of Gas Engineers in June, 1952); Queen's Hotel, Birmingham, 2.30 p.m.

Feb. 6.—Scottish (Western) Juniors: Paper by G. Scott, Uddingston.

Feb. 7.—Wales Juniors (North Wales Section): 'Bulk Supply to a Small Undertaking,' O. P. Cronshaw, Chairman and Convener, Clwyd and Deeside Group, and C. Butler, Distribution Officer, Clwyd and Deeside Group, Pavilion Cafe, Rhyl, 2.30 p.m.

Feb. 10.—Institution of Heating and Ventilating Engineers: 'Automatic Controls for Heating Equipment,' K. Ernest, Cardiff.

Feb. 10.—Wales Juniors (South): 'The Gas Manager and the Town Hall.' D. H. Griffiths. At Llanelly.

Feb. 11 and 12.—Combustion Engineering Association: Conference on Heat Conservation in Generation, Distribution, and Utilisation of Steam in Industry, Grand Hotel, Harrogate.

Feb. 11.—London Juniors: Evening Visit, 6 p.m.: H. W. Nevill, Ltd., Leytonstone Bakery.

Feb. 14.—Scottish (Eastern) Juniors: Short Paper Day; Dundee.

Feb. 17.—London and Southern Section, I.G.E.: 'Preventive Maintenance with Particular Reference to Gasworks Plant,' W. Morland Fox. 17, Grosvenor Crescent, S.W.1. 2.40 p.m.

Feb. 18.—Institute of Fuel: Joint Meeting with Stanlow Branch of the Institute of Petroleum. 'Methane at Point of Ayr Colliery,' J. S. Young. Grosvenor Hotel, Chester. 7.30 p.m.

Feb. 19.—Midland Juniors: Half-day Visit to Joseph Lucas (Electrical), Ltd., Birmingham.

Feb. 19.—Eastern Section, I.G.E.: Short Paper Day: 'Automatic C.V. Control,' K. R. Mortimer. 'The Trend of Gas Consumption and its Effect on the Future,' A. Collinson. 17, Grosvenor Crescent, London, 2.30 p.m.

Feb. 20.—London Juniors: 'Plastics,' J. M. J. Estevez, 6.30 p.m.

Feb. 21.—Yorkshire Juniors: 'Spectroscopy in the Gas Industry,' P. Egan, Harrogate.

HEAVY CHEMICAL PRODUCTIVITY

THE report has been published of the Productivity Team on Heavy Chemicals which visited the United States early last year under the auspices of the Association of British Chemical Manufacturers and the Association of Chemical and Allied Employers. The leader of the team was Mr. J. Grange Moore, Deputy Works Manager of Imperial Chemical Industries, Ltd., and the members included representatives of chemical manufacturers and the various trade unions interested.

The report recommends that the Association of British Chemical Manufacturers should give the highest priority to developing the free interchange of technical information on best British practice within the chemical industry; for example, on the modernisation of factory and plant layout, on the most efficient techniques for the bulk handling of chemicals in all forms, and on the treatment and disposal of effluents.

The Association should consult with interested Government departments how best to make available to British heavy chemical factories the statistical information needed for a proper and continuing assessment of their technical progress in comparison with progress elsewhere in Britain and overseas.

It should investigate and advise the heavy chemical industry on the facilities available for obtaining proper training and information on the application of the techniques of work study to chemical processes and to chemical plant maintenance; and it should determine, in consultation with the manufacturers of heavy chemical plant and equipment, how the needs of the heavy chemical industry, particularly in the design, standardisation and speed of delivery of new plant and equipment, could most rapidly be met.

A further recommendation is that the A.B.C.M. should determine, in consultation with the Scientific Instrument Manufacturers' Association of Great Britain, Ltd., the British Industrial Measuring and Control Apparatus Manufacturers' Association, and the Society of Instrument Technology; (a) How best to increase the supply of engineers, chemical engineers and mechanics trained in the selection, use and maintenance of instruments and of automatic control techniques; and (b) how to improve the technical service provided by British instrument manufacturers to the heavy chemical industry, in order to make a fuller and more effective use of instrumentation and of automatic control.

Trainees Tour Parkinson Works

A PARTY of district representative trainees from Long Eaton, Derby, toured the Parkinson Stove Company's Birmingham works on January 14, as part of their training course. They were the sixth party of trainees from this centre to see the Parkinson factory. All of the men have come from courses being run by Mr. P. J. Bunker, East Midlands Gas Board training officer, at Long Eaton.

The men—13 of them, accompanied by Mr. Bunker—went over the whole factory and saw production of Parkinson cookers from beginning to end. Afterwards, they were entertained in the company's new canteen and social centre. Later, Mr. Bunker said the trainees had gained much valuable information on the methods involved in the production of the modern gas cooker.

The company has already said it is willing to co-operate in any future courses. The visits were another example of the happy co-operation which marks the relationship between appliance manufacturers and the gas boards.

Heat Conservation.—The Combustion Engineering Association has arranged a conference on heat conservation in the generation, distribution, and utilisation of steam in industry to be held at the Grand Hotel, Harrogate, on February 11 and 12. The proceedings will open with a civic welcome by the Mayor of Harrogate at 10 a.m. on February 11, and each of the four sessions will have a different chairman. Dr. A. C. Dunningham will sum up at the closing session.

Management and the Plant Engineer

THE SIXTH ANNUAL CONFERENCE of Incorporated Plant Engineers at Southport on May 20-22 will lay emphasis on the influence of the attitude of management. Of the key men whose task is to translate management decisions into performance, the plant engineer has great responsibility. He must get more and yet more out of plant already heavily burdened; he must so nurse machines that they continue to give a high operating efficiency well beyond their reasonable expectation of life; and he must contrive, always, to keep the wheels turning in face of mounting difficulties and an ever-increasing demand upon his resources, his skill, and his time.

The recently-published report on plant maintenance gives the views of the specialist team that visited America under the auspices of the British Productivity Council. One of the most notable and significant features of the report is the emphasis placed on the rewarding results of closer understanding and co-operation between top-level management and the plant engineer.

This will be among the topics to be discussed at Southport. Members' discussions will be aided by contributions from their guests, who will include: E. J. Parish, General Works Manager and Director of the Renold and Coventry Chain Co., Ltd.; C. B. Davies, M.A., Manager of the Thornton Research Laboratory of the Shell Petroleum Co., Ltd.; Sir Raymond Streat, C.B.E., Chairman of the Cotton Board; and H. Wright Baker, D.SC., M.I.MECH.E., Professor of Mechanical Engineering Faculty of Technology, University of Manchester.

Notices Issued on January 26 announce Treasury guarantees for temporary borrowings by the Gas Council of not exceeding £60 mill. by the British Electricity Authority of not exceeding £110 mill. and by the Iron and Steel Corporation of not exceeding £30 mill.

Benzole is Back

BRANDED motor spirit became available again on February 1 after an interval of over 13 years, and the familiar 'National Benzole Mixture' signs reappeared at filling stations throughout Britain. Output of crude benzole has reached a yearly figure of about 100 mill. gal. from some 260 gas making plants, ten of which refine the product themselves and 80 coke oven plants, 50 of which refine their own benzole. The remainder is transferred to refineries situated in different parts of the country. The new National Coal Board coking plant and benzole refinery at Nantgarw, South Wales, Colvilles' new plant at Tolcross, Glasgow, John Summers and Co., at Shotton, Flintshire, and Dorman Long at Middlesbrough, will between them supply nearly 5 mill. gal. It is anticipated that the Steel Company of Wales and the N.C.B. plant at Chesterfield will add another 5 mill. If benzole was not recovered from coke ovens, the cost of coke would be raised by about 7s. at present prices, which would also mean a rise in the cost of gas. There are so many benzole plants in Great Britain that it has become a 'local product' in most towns and urban districts.

The National Benzole Company, which is 100% British, is owned and entirely controlled by the gas, steel, coal and chemical industries of the country. During the 1914-1918 war many large installations were built to extract benzole from coal for the manufacture of T.N.T. and other explosives. It had also been discovered that benzole was an ideal motor spirit. So, in 1919, the National Benzole Company was formed with the primary object of marketing benzole as a motor fuel.

In those early days benzole was sold by itself—many motorists bought it 'neat' and mixed it with petrol. Sales improved rapidly and, before long, the company decided to supply a standard benzole/petrol mixture to give motorists the benefit of scientific blending and a fuel of consistent quality. The fuel was so successful and so popular that the late John Cobb used it exclusively for his world's land speed records.

When war broke out in 1939 benzole was again required for explosives and as a basis for insecticides, detergents, solvents and dyestuffs. With Japan's entry into the war and the over-running of the Far East the supplies of rubber were cut off and benzole was used for the manufacture of synthetic rubber. The fact that benzole is a raw material in so many modern industries increased the demand to a point where it exceeded the supply for some time after the war.

IN PARLIAMENT

Pensions of Ex-Municipal Employees

VERY soon after the reassembly of Parliament there was a further outburst of questions on a subject which exercised Members on several occasions during earlier sittings. It looks as if the Minister of Fuel and Power will get no respite until the matter is settled—which is one of the merits of our Parliamentary system.

Again it was a case of three minds with but a single question. Mr. K. P. THOMPSON (Liverpool, Walton), Mr. C. OSBORNE (Louth), and Lieut. Commander G. I. C. HUTCHINSON (Edinburgh, West) all asked the Minister whether he had yet decided to make regulations giving the benefits of the Pensions (Increase) Act, 1952, to retired employees of municipally-owned gas and electricity undertakings similar to those conferred by the Act on other retired local government officers.

Mr. GEOFFREY LLOYD said he was not yet in a position to make a statement on this question but would do so as soon as possible. Pressed by Mr. THOMPSON to expedite a decision since there was a great deal of anxiety among a large number of people about this long delay, Mr. LLOYD observed that questions of pensions are almost invariably complicated and required consultations with numerous bodies.

Mr. P. L. E. SHURMER (Sparkbrook) referred specifically to ex-employees of the Birmingham Gas Department who, he said, are suffering as a result of the delay in the increase of pensions. There could not, he asserted, be any difficulty in giving this increase.

Captain J. A. L. DUNCAN (Angus and Kincardine) pointed out that this question was raised at the beginning of December, which meant that the Minister had had two months to consider it. When would he be ready to make a statement? Mr. LLOYD said he had to consult the B.E.A. and the Gas Council, who, in turn, had to consult the area boards.

Atomic Age

Do present developments in atomic research portend another industrial revolution? The rapid progress of research is already being directed to the construction of an experimental atomic power station which will operate a commercial electric power generator. This information was given by Mr. DUNCAN SANDYS (Minister of Supply) in answer to a question by Mr. HECTOR HUGHES (Aberdeen North) in the House on January 26. He asked what progress had been made towards solving the problem of using atomic energy for industries, for travel, and for other peaceful development purposes.

Mr. SANDYS said that the production of electric power from atomic energy had been studied in the light of the experience gained with graphite piles at Harwell and Windscale. The most certain method of generating power from atomic energy would be to build an improved type of natural uranium reactor enclosed in a pressure shell, the heat produced being transferred by a gas under pressure through a heat exchanger to a conventional electric power generator. As a by-product this would yield plutonium, which could be used as a fuel for further reactors.

At the same time, they hoped to develop reactors of a more advanced type, known as 'breeder reactors,' by reason of the fact that they were designed to produce more fissile material than they consumed. To facilitate the study of these methods, a small experimental reactor of this kind was being built at Harwell. It should be completed in a few months' time. Meanwhile work was proceeding at Harwell and Risley on the design and development of a full-scale breeder reactor, capable of producing substantial amounts of electricity, and they were at present looking for a suitable site for the construction of this plant.

They were also building at Harwell a natural uranium reactor moderated with heavy water, which will produce a much more intense flow of neutrons than was possible with present equipment. This reactor was for research work and would not be used to generate power. It would, however, greatly expand the quantities and variety of radio-active isotopes which could be produced for industrial, scientific and medical purposes. This project would take about four years to complete.

Rumour has it that the 'wide boys' are doing a brisk trade in Glasgow selling shillings to frantic slot meter consumers at Is. 3d. a time.

It was too early, added Mr. SANDYS, to say with any precision how soon electricity generated from atomic energy would be available on a significant scale for industrial purposes. It should certainly not be imagined that nuclear reactors would in the near future supersede existing methods of producing electric power. But if, as they hoped, the technical problems involved were successfully solved and these new methods proved to be economical, there was no reason why nuclear reactors should not before very long provide a useful additional source of industrial power.

In reply to further questions, Mr. SANDYS said that certain calculations had been made of what were likely to be the comparative costs of generating electricity from nuclear power and by the traditional methods, but he would not like to state them publicly.

Normanton Gas

A rather unusual type of question came from Mr. A. ROBERTS (Normanton) who enquired what were the constituents, in percentages, of coal gas supplied to the Normanton and Rothwell districts of Yorkshire. Is there, one wonders, something peculiar about this gas to warrant a Question in the House? Unfortunately, we may never learn the answer to this intriguing enquiry since, being a matter of day-to-day operation of a nationalised body (which is sacrosanct), the North Eastern Gas Board have been asked by the Minister to write to the hon. Member direct.

The Elusive 'Bob'

In the good old days when a penny purchased quite a lot of gas we rarely heard of difficulty over shortage of coins for the slot meter. Nowadays, however, when even a shilling goes a lamentably little way we frequently hear of seasonal shortage of the elusive 'bob.' Rumour has it, indeed, that the 'wide boys' are doing a brisk trade in Glasgow selling shillings to frantic slot meter consumers at Is. 3d. a time.

Under the somewhat exalted heading of 'National Finance,' Hansard reports a Question in the House on this subject on January 27, when Mr. PETER FREEMAN (Newport) asked the Chancellor of the Exchequer whether he was aware of the present shortage of shillings, owing to the increase of their use in gas and electric meters over the winter. How many shillings are at present in circulation, he enquired; how many were minted last year and what steps are being taken to augment the supply?

Mr. R. A. BUTLER, in a written reply, said that over 500 million shillings are in circulation. This quantity, he added, was so far sufficient as to dispense with the need for any further issues from the Mint during 1952. If, however, there is a local shortage which cannot be met by redistribution, the Mint will

(*Concluded on page 282*)

Gas in France

—By ASHTON

A selection from the French Technical Press

IN the December issue of the *Journal des Usines à Gaz* the Editor sums up the position of the gas industry in France. Among the outstanding events of the year was the new convention between Electricité de France and Gaz de France which came into operation on January 1, 1952. From that date each of these national services had their own account and assumed entire responsibility for their own finances. Gaz de France finished the year 1951 with a small favourable balance and prospects for the future were promising. But the freezing of indexes in March left gas prices below the level which normally they would have attained. Obstacles which it was hoped had been cleared away revived and one could only hope to surmount them by redoubling efforts to reduce costs and to develop sales, particularly in the domestic field. It is evident, however, that the smallness of capital allocated to equipment in 1952 constitutes a heavy handicap—modernisation and new construction will be seriously checked. On the other hand the recession of business and the revival of competition resulting therefrom has not helped matters. Only redoubled sales effort and economies which can be made here and there will enable Gaz de France to cope with this difficult situation.

The transport of gas from the east to Paris entered a decisive phase. Technically its realisation, which is in a good position, requires the use of relatively high pressures—of the order of 60 atms. The several regulations made by the Administration on this subject have been issued and abstracts of them given in this feature. Considerable interest is taken in the proceedings of the research meeting of our own Institution of Gas Engineers and in the annual report of the Gas Council.

Reverting to the memoir presented to the 1949 London Congress of the International Gas Union on the 'Optimum Calorific Value for Gas,' the Editor remarks in the November issue that since Gaz de France is using more and more gas from the coke ovens of collieries and steelworks, distributing natural gas, making more and more use of refinery tail gases and petroleum derivatives, it is desirable to examine afresh the possibility of an increase in the normal calorific value. Gaz de France has passed the question to the Association Technique which has decided to discuss it in its several interested committees.

Tar as a Fuel

The Association Technique is also undertaking a study of the use of tar as a fuel. In view of the multiplicity and value of the substances contained in this by-product, its utilisation as fuel is indeed regrettable—as the gas industry is the first to recognise—but it may be forced upon it at any rate for a portion of the output if prices fall too far. It is necessary to be prepared for every eventuality and the question is not new.

The classification of gas coke sizes, established as long ago as 1925, is also to be re-examined by the Central Coke Committee—particularly with regard to the smaller sizes, some grades of which may find profitable markets.

M. A. Bolzinger contributes an abstract of his treatise 'The transmission of heat, its absorption and applications in the treatment of gas,' published by the *Journal des Usines à Gaz*. The treatise covers the principles governing the operation of gas washers and the relevant calculations, and the recovery of ammonia, naphthalene, benzole, etc. The abstract is in two parts in the November and December issues respectively.

Economic Aspect of Gas Supply

M. Y. Mainguy, Chief of Statistics and Economic Studies in the Commercial Department of Gaz de France, delivered an outstanding address on this subject at last year's exhibition of industrial heating. It is reproduced in full in the November issue of the *Journal des Usines à Gaz*. The following is a brief abstract:—

In the modern world energy is available in essentially four primary forms: coal, water courses, petroleum, and natural gas, but it is utilised in a vast number of different forms. Electricity is consumed at differing voltages, there is a wide range of petroleum derivatives, and the distillation of coal provides, in addition to gas, coke, and tar, three fuels of widely different properties.

(The word 'valorisation' may be translated 'up-graded' but it is best to keep to it in what follows):—

The transformation of energy from a primary to several final forms may be usefully designated by the general term 'valorisation.' But valorisation is not an operation of pure technique. The engineer may be satisfied with the success of his transformations but the economist must look further. The industrialist must decide whether he is justified in taking the risk of being able to sell the derived forms of energy to consumers at a profit. If his judgment is correct, if he finds customers willing to accept them at the price offered, a true valorisation has taken place.

M. Mainguy proceeded to an examination of the valorisation in the form of gas of its primary sources. There is hardly any usage of gas in which it could not, technically, be replaced by another form of energy which would produce analogous technical results without a great deal of extra cost. Coal, electricity, fuel oil, and butane are competitors with gas in its domestic applications. Coal and especially fuel oil and sometimes electricity can compete with it in the industrial field. In spite of this the use of gas increases, especially in industry where sales are developing rapidly. It is evident, therefore, that the combined economic and technical results of its use present a definite advantage to a growing number of consumers. That, then, is the proof that the transformation of coal and petroleum derivatives into gas constitutes a real valorisation.

M. Mainguy goes on to describe the conditions under which gas in France must compete with its rivals. In all industrial transformations, he says, it is the economic, not the technical, factor which is the determinant. The golden age of gas is over. Particularly it becomes necessary to utilise gases from all sources—coke ovens, oil refineries, etc. M. Mainguy repeats the account of the position in France—that gas-making no longer consists only in the distillation of coal, it includes also cracking and reforming petroleum products, collecting natural gas and gases produced by other industries, mixing, conditioning, enriching.

The rapidity of the development of available energy in developed communities compared with the slowness of the development of the extraction of coal indicates that coal is more and more efficiently used—that is to say, more and more valorised (up-graded) in its transformations into electricity, gas, coke, and tar. It is not unreasonable to anticipate a growth in the consumption of gas in France of the order of 3 to 4% per annum.

M. M. Fischer, Chief of the Physical Branch of the Research Department of Gaz de France, describes in the December issue of the *Journal des Usines à Gaz* ribbed cast-iron radiant panels designed for the use of unmixed propane. The article is illustrated by drawings in some detail. The gas is aerated at the injector. The thermal consumption is equal to that with town (coal) gas and the flames are at least as long.

Trunk Main from the East

The transmission of coke oven gas from the eastern provinces to Paris with a daily capacity of some 35 mill. cu. ft. presented a number of the problems the study of which began early in 1950. The scheme provides for the collection of gas between the Sarre, Carling, Metz, and Nancy. The collecting main has been called the Lorraine Triangle. It will be constructed in steel 300 mm. in diameter and will operate at a pressure of about 47 atm. and fed by six compressor stations suitably disposed. The outlet from the triangle will be situated near Pont-à-Mousson where a final compressor station will enable the pressure to be raised to 60 atm. for transmission to Paris through the trunk main 300 mm. in diameter and 300 kilometres in length. Recompression stations along the route will permit a restoration of pressure to the 60 atm., when the delivery would be raised by 80%.

Work began in June, 1952, on the first length of 130 km. of the trunk main. Purchases and orders have been placed for the land, the compressors and their accessories and their driving motors, the electric transformers and the installations for purification and other treatment.

The scheme of treatment adopted comprises the following stages: compression to 47 atm. in four stages with intercooling; the removal of sulphur under pressure at the second stage (7 atm.) by dry purification in steel towers, except at Carling where liquid purification under pressure will be employed finished by dry purification; primary naphthalene removal after purification; removal of nitrogenous oxides dangerous at high pressures after the third stage (18 atm.); and dehydration and secondary naphthalene removal after the final stage, dehydration being effected by refrigeration at plus 3°C.

The completion of all the works is anticipated towards the end of 1953 or early in 1954. Invitations to tender for the remaining lengths of the Lorraine Triangle and the main trunk line will be issued to contractors very shortly. In the face of difficulties of many kinds the execution of these works, involving pressures never yet employed, will have been accomplished in an extremely short time.

The Coal Position

The coal position appears to be easier than it has been for some time. Production increases regularly and importation decreases correspondingly, the latter to 1 mill. tonnes per month against 1½ mill. in the corresponding month last year. Stocks at the mines which were only 200,000 tonnes at the beginning of 1952 are now approaching 1½ mill. tonnes, against the maximum of 2½ mill. in 1950. The gas industry reported stocks of 541,500 tonnes at November 1 equivalent to 37 days demand. Coke in stock was 250,000 tonnes against a monthly production of about 220,000 tonnes from which is to be deducted 50,000 tonnes breeze and 100,000 tonnes graded coke which forms the safe stock for the technical security of water gas plants installed. The available stock should be absorbed in the course of the winter. The situation in the immediate future is considered to be satisfactory.

INSTITUTION OF GAS ENGINEERS

S.W. Section Meets at Weston-super-Mare

At the invitation of Mr. T. N. Dent, 80 members of the South Western Section of the Institution of Gas Engineers gathered on January 21 at the Weston-super-Mare sub-divisional chief offices and showrooms for an inspection of the reconstituted building, which, it will be recalled, was completely demolished by enemy action. After luncheon the meeting assembled to hear a paper by Mr. J. W. Dean, Manager of the Plymouth and North Cornwall sub-division on 'Nationalisation—Metamorphosis of an Industry,' which is published on pp. 263-266 of this issue.

The Chairman of the Section, Mr. J. W. Denton, welcomed Mr. C. H. Chester, Area Board Chairman; the Deputy Chairman, Mr. E. R. V. Porter; Alderman H. E. Wright, the Lord Mayor of Plymouth, a member of the Board; and Mr. James Carr, Area General Manager.

Mr. J. W. Denton, Chairman of the Section, congratulated Mr. J. Parker (Bristol), winner of the Charles Hunt Memorial Medal in Gas Engineering (Manufacture); Mr. D. H. P. Hammond (Exeter), winner of the Charles Hunt Memorial Medal in Gas Engineering (Supply); and Mr. D. H. Jenkins (Torquay), who won the James Archibald Maclay Memorial Prize in Gas Engineering (Manufacture), and later presented 13 certificates to those present of the 15 engineers of the South Western Gas Board who had been successful in obtaining Higher Certificates in the recent Institution examinations. The Section was proud that of the five medals awarded by the Institution, three had been obtained by members in the South West, and, in fact, approximately 30% of the successful external certificate examinees were employed by the Board.

Mr. C. H. Chester referred with pleasure to the splendid work and high achievement by the junior engineers, and felt assured that this was indicative of the virile spirit and enthusiasm in his area.

Mr. Dean then presented his paper, which was open to discussion.

The Chairman congratulated Mr. Dean on a succinct and finely balanced analysis of the past four years, and asked Mr. Chester to open the discussion.

Mr. Chester referred warmly to Mr. Dean's excellent paper and hoped that the discussion on it would be frank. He welcomed the opportunity to speak as a Past President of the Institution, and passed to the meeting the personal apologies of the President, who had been unable to attend. The Institution of Gas Engineers—the only major corporate Institution in the gas industry—had always been a pillar of strength because men could get together and exchange opinions and help one another to make the industry successful. On nationalisation, and when the formation of the district sections was first mooted, he had seen that the strength depended on the maintenance of strong district sections with qualified members who would put their professional status first. The Gas Council was alive to the part which could be played by the Institution, and by the end of the first year the Institution was accepted as the technical adviser of the Gas Council. Mr. Chester went on to say that it had been his aim to keep the Institution strong, and he was very pleased to see such a large gathering despite the difficulties of travelling over the large area. Great savings had been made by the elimination or integration of small works, and results confirmed the opinion which he had formed on nationalisation that over £500,000 could be saved by adopting good engineering practice.

The paper provoked an interesting discussion to which Mr. James Carr added a contribution, pointing out that an analysis of any situation was always beneficial, particularly when an engineer was willing not only to discuss his successes, but his difficulties or failures.

Much of the discussion was self criticism—frank and useful to professional men engaged in a concerted effort to increase their contribution to the Institution.

It is hoped to publish further details of the discussion in a later issue.

Nationalisation— The Metamorphosis of an Industry

By J. W. DEAN,
Manager, Plymouth and North Cornwall Sub-Division, South Western Gas Board.

Paper to the South Western Section of the Institution of Gas Engineers

MANY of us have been moving forward at such a pace since May, 1949, that we have had time to pause neither for reflection on what was, nor for thoughts on what may be. Events tended to overtake us around that time and for most of us our working (and indeed what should have been our private) lives have been too full for us to stand aside and take a detached view of our industry in its new form.

Following the second world war our industry was sadly in need of rationalisation. This statement will, I am certain, call down abuse on my head from those of our predecessors who were convinced that their undertakings glowed with a superior light in whose radiance other less fortunate contemporaries were allowed to bask. How much sham this outward radiance often concealed is now apparent to all. The fact remains that with a number of honourable exceptions, outdated policy, stick-in-the-mud management, and complacency were rife. Where management and policy were sound an extremely high standard was set and it is from those outstanding undertakings that much of all boards' current practice has been derived. Those of us who have been charged with the task of bolstering up decaying undertakings until such time as assured supplies of gas arrive in bulk, or if the works are to be retained until rebuilding is complete, know all too well that nationalisation has meant re-birth to many. It will be said in extenuation that plant was allowed to run down and a general air of indifference encouraged because of impending vesting in the area boards. Generally, the control of many of the medium and smaller sized undertakings was in the hands of men who had long regarded the industry as a goose remarkable for the unending supply of golden eggs it produced. Little attention was paid to major renewals of tired and worn-out geese.

The Tradition of Service

More important, however, in the decline of sections of the industry in the period 1939-48 was the considerable rise in costs generally, coupled with the very real difficulty of maintaining works and plant in anything like reasonable condition. Rises in costs of basic gas-making materials and labour would speedily have put out of business many of the smaller undertakings who quite obviously could afford neither to sell gas below the cost of production and distribution nor to replace plant which had for too long held together by good luck and by the exercise of brilliant improvisation. The day of the small works man has gone, but fortunately the tradition of service to the community for which he worked so hard and long has been taken over by the boards. It is only fitting that we should pause to remember and pay tribute to such men from whom our industry sprang.

The Report of the Committee of Enquiry, known as the Heyworth Report, produced in 1945 at the request of the Government was a remarkable document in that it was the first official publication in recent years which had attempted to say clearly what was wrong with the gas industry (it also said what was right) and at the same time to advance sound suggestions as to how things might be put in order.

At May 1, 1949, then, we have the position whereby a well-established industry is seen to be divided in two parts—one comprising the larger, more substantial, well-managed and progressive undertakings keeping themselves abreast of all development both technically and in the commercial field. Such undertakings by modern manufacturing methods aided by progressive selling of gas could have weathered the financial storms engendered by rising costs and still have sold gas to all users at prices competitive with other fuels.

The second group was made up of the small units of production often with great possibilities for expansion in the sales of gas but without the means of achieving such sales and furthermore facing a very real possibility of having to cease manufacture owing to financial difficulties.

Into the breach on that date there stepped the area boards. Fortunately for the industry generally, sufficient time had been allowed for staffs to be appointed and the new administrative system to be tested, at least on paper, before vesting day. Still more fortunate was the system adopted whereby the administration was, if not perfect in all eyes, at least made up of men who had intimate knowledge of the functioning of the industry. In this respect the gas industry was more fortunate than some of its competitors and contemporaries on whom nationalisation descended. A balance was wisely struck between retaining men of mature years with a wide experience of management of sound progressive undertakings and bringing into the new appointments younger men with high technical qualifications to meet the need which would presently arise for logical and progressive re-planning of the industry's activities.

Continuity of Action

By May 1, 1949, it had been found possible for an appreciation to be made of the potentialities of the undertakings absorbed and contact had been made between local officers of undertakings and the holders of the new posts. Thus was continuity of action achieved. Continuity of service to the public was never at any time in doubt—indeed, the public generally was not aware of the metamorphosis.

The first goal had been achieved and here was the industry in its new guise ready to take on where its components had left off—ready, furthermore, to apply itself to its own revitalisation where necessary and by a judicious application of its technical knowledge, financial strength, and combined experience of all its officers and servants to offer to the consumer a competitive service second to none in the fuel industries.

As was inevitable a considerable time was spent in assessing the large number of undertakings vested in the board, and this necessitated the accumulation of a considerable amount of information which had to be obtained (as no one else could provide it) from the officers at the units absorbed. The correct formula for the collection and collation of all this information had not yet been found, as was inevitable with the re-birth of the industry, and, while a considerable display of acerbity on both sides was noted in the early stages, wisdom prevailed and the desired end was gradually achieved. Experience shows us that 'make haste slowly' might well have been the watchword. The machinery was not yet ready to take the full load and, indeed, at times the serious overload which was placed on it. It must be remembered that all the information required was not available at short notice. In small undertakings it was often either not recorded at all or if recorded was in a totally different form from that in which it was required.

Eventually the statisticians and planning staffs received the information they required and the work commenced. Planning, of course, requires a policy—in the case of our own area, one in which manufacture would progressively become centralised as the smaller and medium sized works completed their useful life and complementary to it a distribution system provided linking these centres of production with the units of the sub-division where gas would be fed to the local mains. In some cases a surplus of gas at the larger centres was available immediately and this allowed a number of small works to be shut down at an early date.

As was to have been expected, the planning brought in its train a tendency towards standardisation both of practice in manufacture, distribution, and sales and, wherever possible, of materials purchased and appliances sold.

This standardisation was perhaps the feature of the new industry which least impressed the individualists. Irrespective of the size or relative importance of their pre-vesting undertakings each imagined his system to be superior to all others of like size, and a good deal of time which could be ill-afforded was spent in persuading some people that the new system had not only come to stay but was one of the fundamental items of policy.

In a rash moment sometime late in 1949 when the shape of the organisation was becoming apparent, I ventured to suggest that while a considerable amount of the implementation of the planning (which was dependent on so many circumstances) might not be realised by that time, all the planning on paper should be completed in five years from vesting day. I still believe that we shall be well on the way to that target by that date even if we have not completely achieved it. Experience has taught us all that if the first plan produced after many months of effort becomes obsolete overnight, by an essential change of policy, we have not lost anything. We have gained experience and the second plan will be all the better for the work which was put in on the first. What, then, have we achieved in the 45 months since we all came together into this new enterprise? I should like to look at the various sections of our industry and pick out the highlights of development which nationalisation has brought about for the benefit of us all.

Production

While manufacture must in the reasonably near future be centralised at the major units, the necessity for the continuance of production at other units has resulted in a considerable amount of time and money being expended. Coal supplies have been re-routed where economies could be effected. Plant on works long in need of overhaul has been replaced (often by items surplus at other works). Control of calorific value has been improved and modern instruments have been provided where formerly men worked to rule of thumb. Specialist advice on technical matters is now readily available. All these and other services and advice available to the smaller units have resulted in many cases in a remarkable rise in efficiency which has produced a considerable reduction in cost of gas into holder.

The former practice of 'make-do and mend' has to a large extent been abandoned on such works, not because of the availability of money for lavish spending, but because area boards know the wisdom of wise spending to effect economies. Cleanliness and efficiency run hand in hand and the new spirit engendered has, I suggest, produced a crop of revitalised gasworks each of which, even if the trend of rising prices causes it to be subsidised to some degree, emerges as a reasonably efficient unit. I have in mind two such works of which I have knowledge. One making 25 mill. cu.ft. a year in stop-end horizontal retorts 9 ft. 6 in. long is regularly turning out 74 therms to the ton with suitable producer gas dilution to 460 B.Th.U. Indeed, when an efficiency survey was carried out recently it was decided that the only loss in efficiency from theoretical was caused by gas escaping from the mouthpieces during charging. As no means of overcoming this could be devised other than keeping the lids shut at such times it was decided that the plant might be considered reasonably efficient.

The other works of an annual output of 5 mill cu.ft. with a bed of 9 ft. stop-end horizontal retorts which cease gas-making at night has increased its thermal yield from 56 to 61 following the installation of a recording calorimeter and the overhaul or replacement of items of plant on the works many of which were long overdue for scrapping.

There is no doubt whatever that wherever the will to have an efficient and tidy works was apparent the benefits which were made available to such works have produced amazing results.

Distribution

While awaiting the promised supply of gas in bulk distribution engineers have found plenty to occupy their minds and time. Making larger quantities of gas available, either at the local works or in bulk from without, fails to bring satisfactory returns if the gas cannot be distributed locally at all times at adequate pressures. Investigation proved that while undersized and in many cases severely corroded mains were responsible for many distribution difficulties at the smaller undertakings, our predecessors' ideas on service mains and service pipes made little or no provision for the future. One can only be charitable and assume that the man who fed six cottages in 1910 from one ¾-in. service did not intend his successor to add six more at a later date. Service relaying has been given high priority and the results of four years of intensive work are now beginning to show results. I would like to add that, contrary to an opinion held rather widely, the consumption per consumer does not tend inevitably to rise when an adequate supply is given. In many such cases the tenant of the smaller house asks only for a constant supply for cooking and perhaps a wash-boiler, and while the relaying of the supply affords great satisfaction to the housewife it does not lead to any great desire immediately to install additional appliances. The pattern of this department's work is clearly seen as an immediate improvement of supply at the consumer's house, a gradual improvement in district main conditions, and where necessary the running of new ring or feeder mains. When all this has been done everything will be ready for the supply in bulk when it arrives. A great deal of this improvement has been effected with the aid of mechanical devices which many of the units involved had not used previously. Service and main clearing devices and power tools for excavation and backfilling have all speeded the work and reduced congestion in the narrow roads and lanes which are a feature of our area.

Commercial

The task of this department after vesting day, in the application of the Board's sales policy, while it caused some headaches was not immediately of the magnitude of that of the other departments. There still existed the sellers' market and goods virtually sold themselves. This was all to the good as it provided a regular turnover of appliances and allowed the sales staff some time to give serious consideration to policy. Eventually a system of selling, fixing, maintenance, and home service was evolved, and while spectacular results were avoided the foundation was quietly laid in this the most important of all departments. The day of the sellers' market could not last and anyone who expected it so to do was a fool to himself.

It is not always appreciated that the efforts of our production and distribution staffs would be so much waste of time if the selling of our service to the public were at fault. It is true to say that some gas and some appliances would automatically sell, but the time is overdue for a true appreciation of what can accrue to the revenue of a Board from a sound and progressive sales policy.

The uneasy truce with our principal competitors is fast coming to an end and we must expect in the near future to

have to go out to fight for loads which may mean the difference between a balanced and an unbalanced economy to them. Make no mistake the fight is yet to come. Are we prepared and equipped in every way to meet the challenge? I shall return to this point later in view of its supreme importance to the future of the industry.

Accountancy

One would probably say that the only really happy group of people at vesting day were the accountants. Renowned for the multiplicity of forms which they are able to 'think up,' here indeed was a paradise for them. Their task, to produce for Parliament a standard set of accounts, called for an early standardisation of accountancy methods at all levels. Hard things have been said of these people and the volume of statistics they have amassed is amazing. Nevertheless the first fruits are already apparent and the by-products of their prime function in the form of the breakdown of costs in all departments is not only making plain to all the economies already affected in every department, but is steadily leading to other and greater savings. We are promised still more detail, and while we shall make good use of it we must take care that the men do not become the slaves of the machines—with the consequent production of statistics for statistics sake.

I have tried, without at any time getting bogged down in excess detail, to point out some of the advantages accruing from the nationalisation of our industry. The advantage has not been entirely that of the smaller undertakings—much as they have benefited. We who have been privileged to bring some of these benefits to others have been more than ever impressed at the high standard of ingenuity and improvisation which the managers of the smaller works have exercised to keep their plant running at a reasonable level of efficiency.

The Future

And now to the future—what of it? The transition stage is over and although we generally are in no different a position *vis-a-vis* the general gas consuming public from that which we occupied prior to nationalisation we are, all of us, more in the limelight. The welfare of the consumer has traditionally been the aim of the gas man and a change of ownership should not have brought a change of outlook on the part of the industry's employees.

Unfortunately the more sensitive among us may have been a little alarmed by the tendency for all our doings and public sayings to become a source of interest to all and sundry outside the industry. Some of these people are cranks who write to the newspapers and indite anonymous letters to us for no other reason than their own eccentricity. There are others who would cheerfully make of us political catspaws and it is of their actions we must beware. If we all so conduct ourselves on behalf of the industry in such a manner that it may be apparent to all that the welfare of the industry and the consumer are uppermost in our thoughts we need fear no criticism.

Public ownership inevitably brings a greater public interest, some genuine, some malicious, in the daily doings of that industry and its employees. It also leads uninformed or misinformed persons to criticise destructively the operations of the industry. Much of this is dying down, but it is only necessary to observe the sporadic outbursts against such organisations as the Post Office to realise that in our business life we skate on the thin ice of public approbation which thaws rapidly at times to let us down into the water beneath.

Outside criticism and comment of this nature is, as I have said, inevitable. Far more insidious is the tendency, still unfortunately quite prevalent in some sections, to criticise the industry from within. By this I do not refer to the usual 'grouse' which each of us has at some time or other. That in itself is harmless and a useful safety valve as is the self criticism which is such an excellent feature of our various regular staff meetings.

At many levels there is some dissatisfaction with our new organisation, much of which can be rectified by a proper approach to the problem by everyone concerned. There has been too great a tendency, however, for the shortcomings of the new system to be discussed by the dissatisfied, with persons outside the industry, to the detriment both of public opinion of our doings and of the individual's own reliability in the eyes of the board.

No organisation can be wholly happy and successful in its endeavours while the weak links exist in the chain. One adverse criticism from within when expressed to a member of the public can do more harm than a series of uninformed attacks from outside, and if we stand condemned out of the mouths of our own staff and workpeople can we wonder at some of the hard things which have been said about us outside? Fortunately, a wiser outlook is at last apparent and there are signs of a happier atmosphere.

We are as an industry, both nationally and at local level, a great trading concern, and our well-being is directly tied to the volume of business we transact with our customers. All our technical improvements in the manufacture and distribution of our product are wasted if we cannot directly relate them to increasing sales of that product to the detriment of our competitors' sales. Today we have been given our great opportunity. A national tendency towards the employment of smokeless fuels available at all times in guaranteed quality can be emphasised if we seize this opportunity with both hands. Unfortunately we are as an industry only on the verge of any real ability to sell our products. Heretofore they have generally sold themselves with little competition. We have to increase sales of gas to justify the money we have quite rightly, as the first step, sunk in our manufacturing and distribution schemes. Cheaper gas in conjunction with the attractive tariffs we now have and the even more attractive terms we hope to be able to offer in years to come will enable us to step up our output and increase the numbers of satisfied consumers using gas and coke as their main fuels. The snowball will grow and steadier base load consumptions must, with the added economies they effect in manufacturing costs, lead eventually to cheaper gas and rising consumptions. We must, however, discard the idea that these fuels will sell themselves.

New Angle of Approach

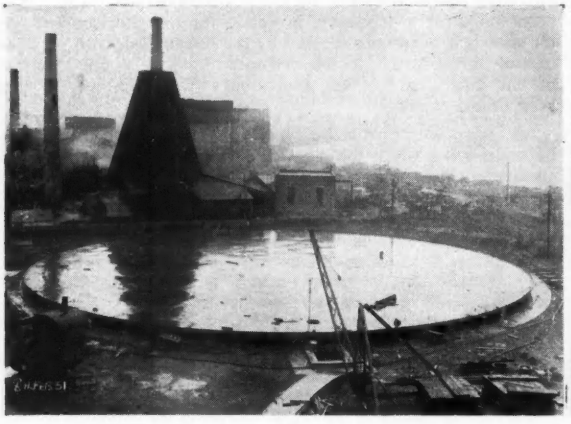
As our competitors realise the necessity for the more efficient use over the 24 hours of the day and the 365 days of the year of the costly generating plant recently laid down and now largely used to meet peak demands, their drive for added business will be intensive and the competition keen. We as an industry must approach the sale of our commodities from a new angle. Selling is a specialist task, and we have far too long relied on men trained in our own business to sell to the consumer. At best it has been a half-hearted attempt. We must now bring in the expert. High pressure selling is distasteful to many of us, but we must recall that it has never yet failed where the commodity offered has given value for money. The potential consumers are there, when we can by our sales methods induce them to try our products. Once having tried they will need no further convincing.

And now a glance still further ahead. Are we not measurably nearer the day when in all save the most isolated parts of our area we shall offer our consumers an assured service—not merely a supply of gas and coke, but the combination of publicity, salesmanship, after-sales service, home service, maintenance of appliances, technical advice, and, above all, assured supplies of standard quality fuels, either gas and coke—in short, a two-fuel service which is unbeatable?

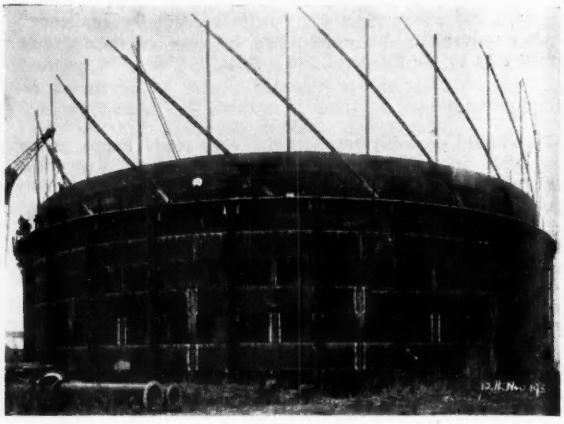
If only we have the courage of our convictions we cannot go wrong—but most essential is the development of the right relations with our consumers. Never at any time in the history of our industry have the prospects been brighter nor the rewards higher, but delay is our greatest enemy.

(*Concluded at foot of next page*)

HOLDER CONSTRUCTION FILM



The above photograph shows the tank bottom plates on 'horse boxes.'



Here is the tank complete and erection of middle lift in progress.

AT a meeting of the Scottish Junior Gas Association on December 22, 1952, under the presidency of Mr. R. A. Currie, Mr. D. C. Dow, Deputy Engineer and Manager, Alloa undertaking, Scottish Gas Board, introduced a film produced by Mr. E. Lynn, Technical Assistant, Alloa, showing the construction of a 2 mill. cu. ft. gasholder at the Alloa works. Mr. Dow's talk was divided into four parts, these being presented in conjunction with the film, which comprised four spools.

In the course of his comments Mr. Dow explained that the holder is of the three-lift spiral guided type in a steel tank. In 1948 the order was placed by the Alloa Town Council with Newton Chambers & Co., Ltd., who hoped that it could be completed in June, 1952. This delivery date has been exceeded by only one month, an achievement which is rather remarkable in these days of delays and steel shortages, and speaks highly of the efforts of Newton Chambers.

The main details of the holder are: Overall diameter 162 ft., height 148 ft., minimum pressure 7 in., maximum pressure 13 in.

The capital cost of the holder was £89,500, foundations £19,000, and connections a further £10,000.

The site selected for the holder was a portion of ground which had been partially reclaimed from the River Forth over the course of a number of years, and, having been made-up ground, it was necessary to pile the foundations. By means of trial boring, rock was confirmed at an average depth of about 30 ft.

The foundations were designed by Macdonald Partners, Glasgow, and the actual construction was entrusted to the Fram Reinforced Concrete Co., Ltd., Glasgow. It consists of a reinforced concrete raft 164 ft. dia. by 15 in. thick, supported on 513 17-in. dia. cast-in-situ 'Vibro' type piles. Piling commenced in November, 1949, and was completed by March, 1950.

Construction of the foundation slab was started immediately afterwards, but this was held up for a considerable time due to the acute shortage of cement which occurred in 1950, and completion was delayed until August, 1950.

[The first spool of the film showed the construction of the foundation, including the piling operations.]

Newton Chambers & Co. arrived on the site about Christmas, 1950, and all labour, apart from their erection foreman, was recruited locally. The tank bottom plates were erected on wooden trestles or 'horse boxes' about 2 ft. 6 in. high in order to facilitate the riveting together of the plates. The rivets were inserted hot and held up from the underside by men lying on their backs on the concrete. The tank bottom was bolted together complete with the bottom curb before riveting commenced.

The bottom row of side plates was bolted together and to the bottom curb and riveted, and after test the underside of the tank bottom was lowered on to the foundations.

[The second spool illustrated the construction of the tank, while the third and fourth spools showed the construction and erection of the three lifts, including filling tank, testing holder, and the final purging prior to filling with gas.]

No painting of the gasholder and tank was carried out before despatch from the makers' works, the policy adopted being to allow the surface of the steel plates to 'weather' to ensure the removal of all mill scale before painting was started. All mating surfaces were painted with red lead as the erection proceeded. The inside of the holder and the tank were also painted one coat of red lead as erection proceeded. The portions of the cups and dips in contact with water were coated with Humidine on the bare metals as erection proceeded.

METAMORPHOSIS OF AN INDUSTRY — Concluded from preceding page.

Are we, its custodians today, equal to the task? The differences are settled, and arguments are over. The way is clearly marked for the gas industry to emerge in the years to come to a pre-eminent position in this country as the people's champion in the ageless struggle for a brighter, cleaner, smokeless Britain. We pride ourselves on being a balanced industry in that we have two fuels to sell. Let us see that the balance is maintained—let our consumer service be of a standard equally as high as our technical ability and progress.

We are all of us today, with the possible exception of some of the technical specialists, becoming progressively more and more administrators and less engineers. The metamorphosis is there as in the industry generally. We are all of us still learning a new job, and I have tried to convey to you my concern lest the lack of appreciation of the need for a truly balanced industry may lead us to neglect the tremendous advantages we have as a result of our great technical achievements.

In the fuel industry we need fear no competitor. Let us 'go to it.'

BUTANE-ENRICHED WATER GAS

The following discussion took place at the research meeting of the Institution of Gas Engineers on the paper presented by Dr. E. JOHNSON, of the North Eastern Gas Board on the 'Manufacture of Butane-Enriched Blue Water Gas on Small Undertakings'.

MR. H. S. CHEETHAM (General Manager, Humphreys and Glasgow, Ltd.), said that the selection of suitable plant for small gasworks which were too remote from their neighbours to receive bulk supply was a problem which had received the attention of many of them in recent years. In regard to the specification of the plant, the points set out by the author were in fact particularly exacting, and in regard especially to capital cost it bcame almost imperative that the plant selected should be such, and have such reliability, that a standby plant was not needed, otherwise, the capital cost would not conform to what Dr. Johnson had described as being 'low.'

The opportunity which Dr. Johnson had in trying out this experimental work at Spenborough must have been unique, for in point of fact he ran one gasworks within another. He was able to make butane-enriched blue water gas within the works, try it out on appliances within the works, mix the gas back with the present production, and so carry out all that experimental work without in any way jeopardising the town supply until he was completely satisfied that in fact the butane/blue water gas was interchangeable with the coal gas which was normally made on the small gasworks and which they knew had a specific gravity of 0.621 as compared with the butane/blue water gas of 0.66.

Tribute to Pioneers

Tribute should be paid, said Mr. Cheetham, to Mr. Currier and to the North Eastern Gas Board for having pioneered the work, which, he was sure, would be useful to all the area boards, because the problem of the small gasworks was not restricted by any means to the North Eastern area. He knew of quite a number of works in other areas where they had an equally difficult problem.

In regard to the blue water gas plant which was installed at Spenborough, it was of the same type as was developed by his own company some 20 years ago to provide diluent gas for use in the small gasworks where invariably they had hand-charged horizontal retorts. Throughout that period that plant had been shown to be extremely reliable, and although the modern version incorporated many developments and improvements, there had been no sacrifice of reliability.

In a small works it would be possible to carry out all the repairs to such a plant, excluding the relining of the generator, within the time which was provided by gasholder capacity. The question of relining the generator, however, was another problem, and the latest development was to provide a blue water gas plant of the same type which incorporated a standby generator. This could be brought into use quite quickly and remain in use until such time as it was necessary to return to the other generator, which in the interim had been relined.

In regard to the costs of manufacture of butane/blue water gas, he noticed that Dr. Johnson, wisely since he wished to be conservative, had counted on the full-time services of one gas maker to control the operation of the water gas plant. Plant of this type, as he mentioned, required to be charged at infrequent intervals and also clinkered likewise at infrequent intervals. When these plants were installed in gasworks where they were used for dilution, it was the general practice for the retort house stoker to attend to the blue water gas plant in the course of his normal day's work in the retort house. He thought therefore, that on the small works envisaged it was reasonable to count on the gas maker having available a certain amount of time which he could devote to other duties.

In some systems the butane provided the whole of the therms which were distributed in the town gas. The butane therm was much more expensive than the blue water gas therm, and in so far as butane/blue water gas gave them a gas which was interchangeable with town gas, it was also cheaper than a gas in which butane provided the whole of the thermal content.

Mr. A. G. Turner (Shell Mex and B.P., Ltd.) spoke of the linkage of butane price to that of motor spirit. There had been among the gas industry an unfortunate tendency to regard butane and propane or L.P. gases as waste products. He would like to disabuse the industry of that idea immediately. Butane, as butane, could be added, and was added, to motor spirit in quite considerable quantities. While butane had this motor spirit additive value, such give-away prices as would apply to waste gas could not be considered.

The other liquid gas which could be used, and undoubtedly would be, within the gas industry was propane. Propane could not go into motor spirit as such, but it could be and was polymerised, and as such propane was a source of high-quality aviation petrols.

Dr. Johnson had mentioned a recent decrease in the price of motor spirit of ½d. per gal., which he said was reflected by a reduction of 16s. in the price of the butane at Spenborough. In their present negotiations with various gas boards, they had always made this linkage butane price quite clear; and as far as production in this country was concerned, his own company drew supplies from five major refineries, four of which had supplies of L.P. gases currently available, and the fifth of which would most probably have them available very shortly.

Production Cost the Deciding Factor

Mr. R. J. S. Thompson (Continental Representative, W. C. Holmes & Co., Ltd.) remarked that it was inevitable that comparisons would be made between the method of production of gas for small works described in the paper and other systems which had been proposed or were in operation. In all cases the final decision would depend largely on the cost of production of the gas, assuming the gas to be suitable for the purpose in view.

Accurate cost data were not available for the butane/air system, which was the only alternative system at present operating in this country using liquid hydrocarbons, but as far as it was possible to estimate such costs for a general case, using the butane prices which Dr. Johnson had quoted, the cost of butane/air gas would be of the order of 18d. per therm including all charges, alteration to burners included.

If this was compared with the costs given in the paper, it would be seen that the butane/blue water gas system produced cheaper gas above a capacity of about 100,000 therms per annum, and the butane/air system was cheaper below that figure.

In the butane/air system the cost of the butane itself was the major item. According to Dr. Johnson's data, this amounted to above 15d. per therm delivered to the works. This price depended on many factors, but clearly the price of butane/air gas could not fall below the price per therm of butane delivered to the works. Dr. Johnson quoted prices of 13.54d. per therm for butane/blue water gas in a sufficiently large plant, so that it was clear that butane/air could not compete in this range.

This was quite in accordance with the general idea of butane/air plans; examination of cost data showed that such

plant gave favourable costs up to a capacity of the order of 100,000 therms per annum. In specific cases, depending on local conditions, the actual limit might be well above, or below, this figure.

For very small works, the butane/air plant had the added advantage of simplicity, initial low cost, completely automatic operation, an absolute minimum of attention, no by-product plant, and only one raw material and one product. If necessary, the plant could be adapted to work without a gasholder.

The three disadvantages to butane/air mentioned by Dr. Johnson could be dealt with as follows:—

(1) High specific gravity and its effects on distribution. If butane/air at about 750 B.Th.U. per cu.ft. was distributed the capacity of the mains system, etc., was not less than with coal gas.

(2) The alteration required to appliances was well understood, and had been carried out in many cases already with complete satisfaction.

(3) There was no need for the oxygen in the gas to cause corrosion in the distribution system if dry gas was sent out. This could be done at negligible cost.

Among the other systems available which Dr. Johnson examined and decided against was the French G.E.I.M. oil gas plant. The criticisms of this process were probably justified at the time, but this system had been modified to make a final gas very similar in characteristics to normal town gas, which it could replace directly. The oil gas was produced in automatic cyclic system, and then treated catalytically. Small-scale plants had operated successfully and a large-scale plant of about 3 mill. cu. ft. per day was under construction. Accurate cost data were not available, but the price was said to be about equal to that of carburetted water gas. The plant could use gas oil or could be adapted for butane or propane. The success of the large-scale plant remained to be seen.

Finally, he would add that cold carburetting of blue water gas and of producer gas with propane had been adopted and was in operation at many Continental works for peak loads, but he did not recollect a case where it was used exclusively to supply the whole of a works output. Propane was naturally used in preference to butane for all these purposes when it was available, on account of its greater volatility, which was important in cold weather.

The Medium Size Works

Mr. D. N. McGaskill (Eastern Gas Board) said that while the author set out to show that on the very small remote districts of gas supply a simple plant making butane/water gas could be advantageous, where the existing plant was obsolete—and no one would contradict him on that point—his whole paper would appear to have been written to give the impression that such plants could show very favourable results on the medium-sized works—*i.e.*, when viewed from the small works point of view—and referred to by the author as districts with gas consumption of around 20 to 70 mill. cu. ft. per annum. It was on that size of plant that he wished to base his comments.

Taking the average size of plant—*i.e.*, one producing 44.4 mill. per annum at 450 B.Th.U.—the assumed maximum day was shown as 170,000 cu. ft. His experience of a works of this size—and the works was very much south of the author's area—was that the figure was just over 200,000 cu. ft. per day; and on this hinged to a very great extent the cost of gas into holder. The labour costs only allowed for two shifts, but it would appear that, all things considered, and taking into account shift, relief shift, day off per week, sickness, holidays, etc., three operators were necessary. Coke required for the present plant was charged out at 92s. per ton delivered, whereas the present price for coke on works was that figure. Could Dr. Johnson confirm this figure? The cost for purification presumably covered the whole process, including all works labour, for no other charge was given; and a figure of £84 per annum would seem low. Would Dr. Johnson agree that the works might need a full-time day labourer, and revise the figure accordingly?

It would seem that where a new plant had to be put down there was still a good case for an up-to-date small vertical installation, where the proved production cost was the same at around 13d. per therm, and where the increased wages bill on the complete coal gasworks process would appear to be most valuable to a small district, especially in view of the recent slight rise in unemployment.

Mr. S. L. Wright (Wales Gas Board) remarked that the development of the use of liquefied petroleum gases had quite an international flavour, judging by the interest of American and Continental visitors in the work that the Wales Gas Board had carried out at Whitland. There was even a symptom of some rivalry between Wales and Yorkshire as represented by the North Eastern Gas Board over the respective merits of butane/air mixtures and butane/enriched blue water gas.

Reference was made in the paper to some of the leading oil companies being able to utilise most of the propane for their own purposes but having butane available for disposal. This availability of propane and/or butane would almost certainly vary at different refineries, and where permanent plant was installed, such as static containers and vaporisers, it would appear to be a sound policy to design these for propane, even though they were initially intended for use with butane.

Comment was made on the high percentage of oxygen in butane/air mixtures. This certainly appeared most unorthodox practice when the idea of butane/air mixtures was first proposed. Continental experience indicated that corrosion could be avoided by distributing gas of low dewpoint, and their own experience showed that they could obtain the theoretical dewpoint at inlet gasholder. The old mains and particularly the gasholder connections on the Whitland works were causing some trouble through in-leakage of moisture.

Experience at Whitland

A butane vaporiser was definitely necessary in cold weather. It had been found possible at Whitland to draw off butane vapour from three 1-ton containers at a rate of 153 lb. per hour during the summer months compared with the 85 lb. per hour used at Spenborough. It would be of interest to know if any experience was gained with vapour as distinct from liquid discharge at Spenborough, as it appeared that the automatic Sigma control would successfully cope with changing properties of the petroleum gases evolved as a result of fractional vaporisation. This was not so far automatically covered by butane/air mixing plants.

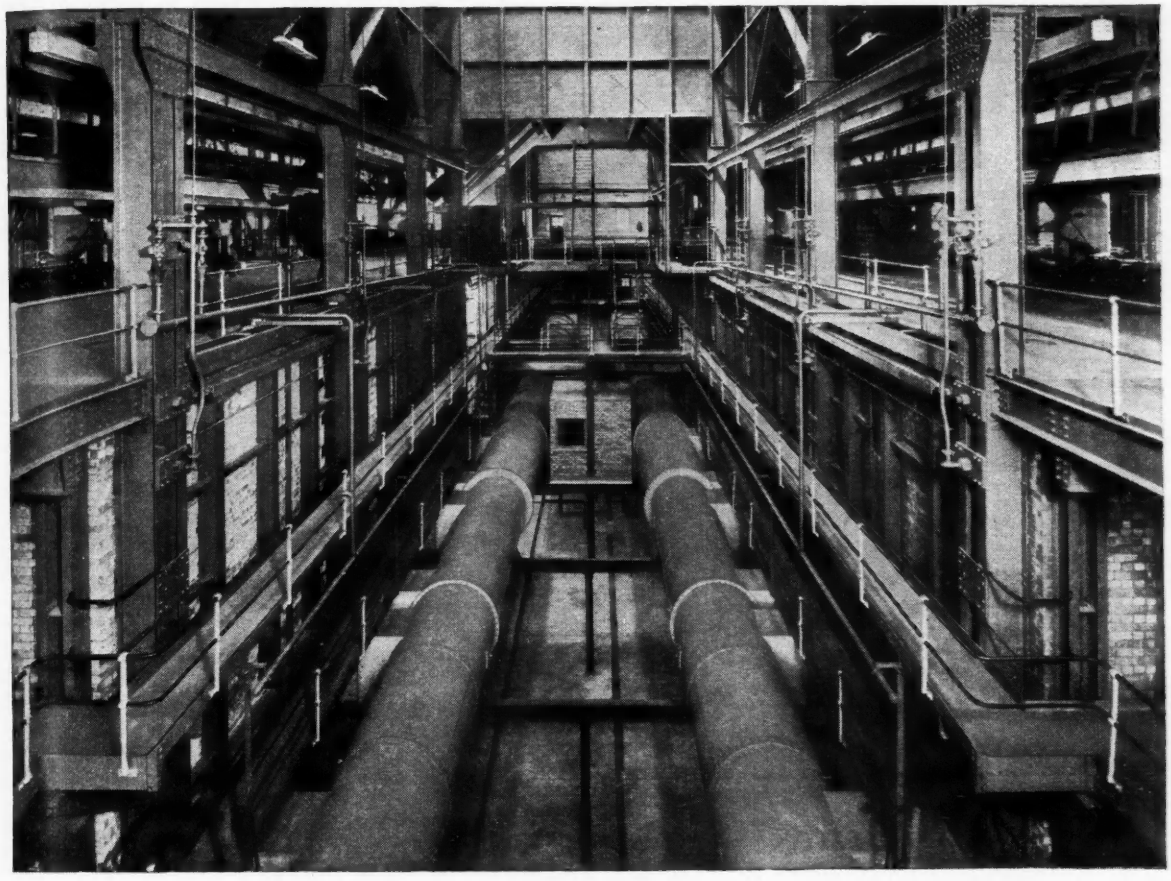
There was a reference to 16 hours storage as being normal at a gasworks. The modern tendency was to accept 12 hours as the lower limit. Even with 16 hours storage, a 33⅓% increase in demand, which might well follow the improved standards of supply achieved with butane-enriched blue water gas as compared with small coal gas plants, would reduce this to 12 hours.

Comparison was made between the characteristics of coal gas of 500 B.Th.U. and butane-enriched water gas used to replace it. Cost of manufacture tables indicated that butane-enriched water gas of 450 B.Th.U. was cheaper to produce than similar gas of 500 B.Th.U. It was submitted that the calorific value of the gas supplied should be determined to take the maximum advantage of all factors of cost of manufacture, storage capacity, and thermal delivery of distribution system, whatever the type of gas supplied, and that changing circumstances should be met by revision of calorific value where justified. It would appear that 500 B.Th.U. might not necessarily be the most economical quality for butane-enriched blue water gas. The need for appliance adjustment might well have to be accepted to obtain the fullest advantage from butane-enriched blue water gas. In the same way, appliance adjustment was accepted in the case of butane/air gas in order to secure advantage of increased thermal storage capacity of gasholders and maintain thermal delivery of the distribution system.

Under cost of production, the author had stated that costs had been assessed on the basis of taking the maximum day as the maximum output of the plant. This allowed no reserve capacity for future development and for peak cold periods. He had already referred to an increase in demand as being a reasonable expectation following the introduction of a more consistent supply of gas, and would suggest that the costs shown for undertakings using the plant for three shifts a day were, in fact, on the low side.

This was covered in the paper by the change in size of the blue water gas plant recommended for an undertaking sending out 100,000 therms per annum, which was shown as

(*Concluded at foot of p. 273*)



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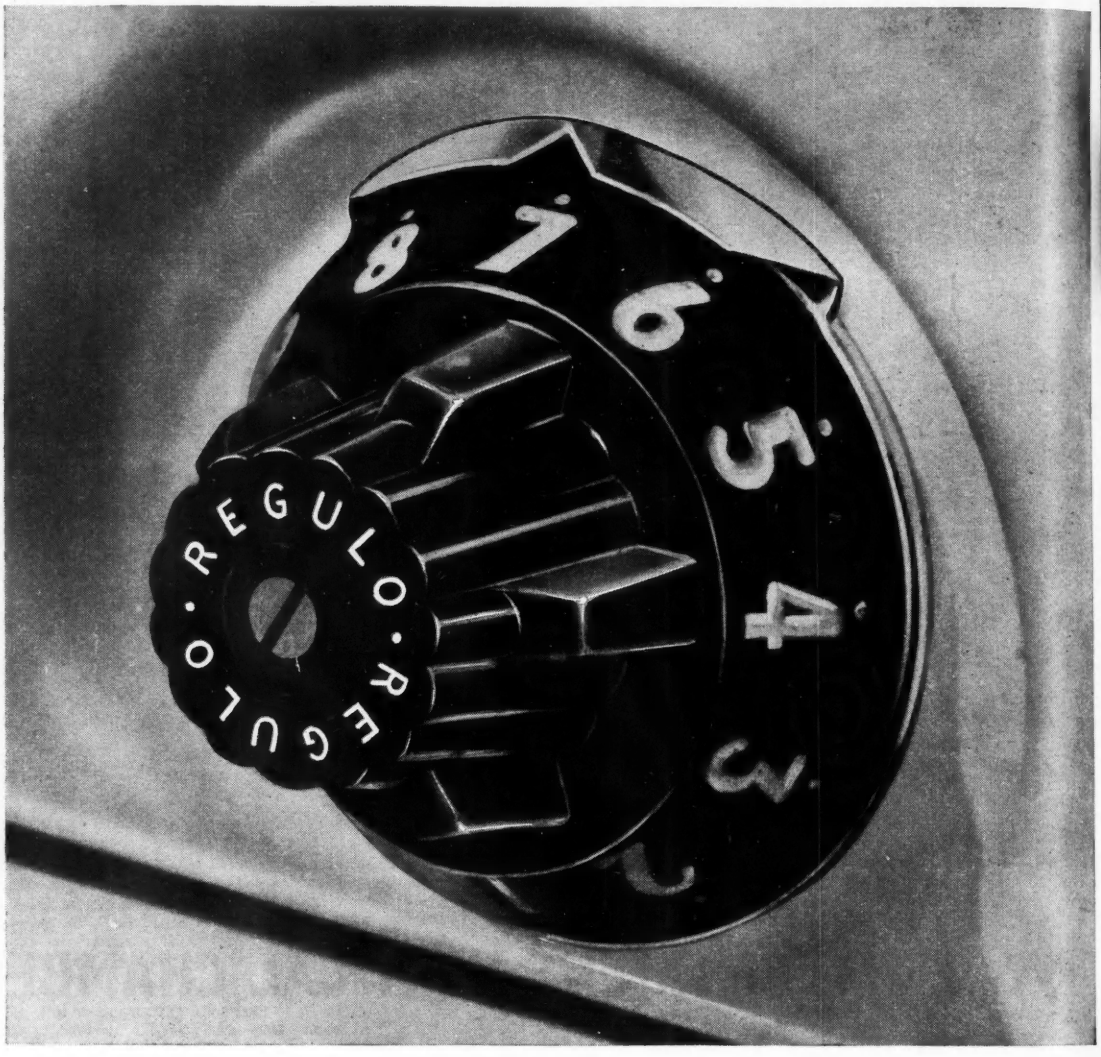

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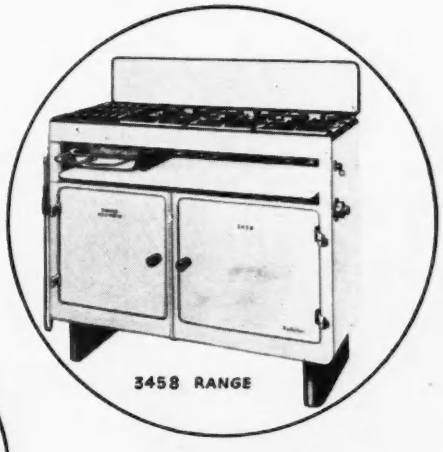

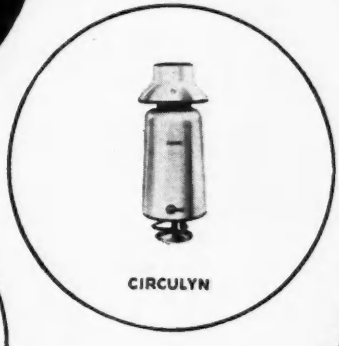

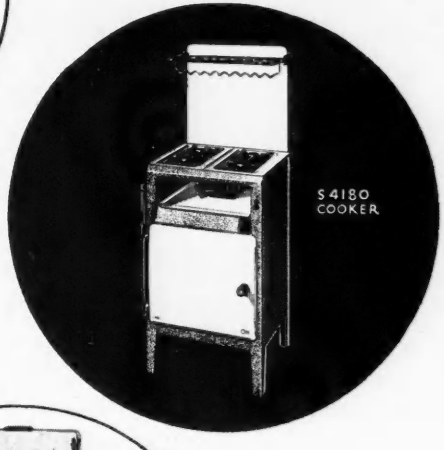

NEW WORLD NEW WORLD NEW WORLD

This general view shows plant at the Beckton Station of the North Thames Gas Board. (Photograph by courtesy of the North Thames Gas Board).

The first of three single lift spirally guided Gasholders installed by us at this Works. A 4th Gasholder is at present on order.

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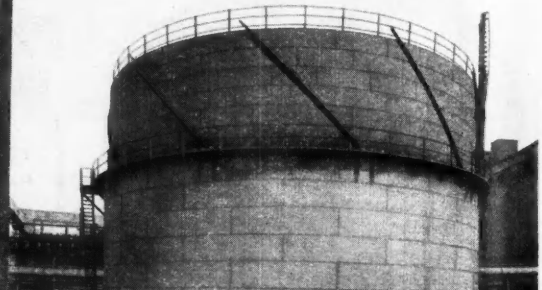

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using a water gas plant for three shifts, and also comparative costs were given for the same undertaking using the larger water gas plant for only one shift. But there were top limits which would entail larger plant being put in, and it was customary to allow some margin for plant expansion when they were designing their works.

Capital costs were defined in the paper as including the blue water gas plant with spare generator and mixing unit, foundations, building, boiler, butane storage, spare trailer, and mounted cylinder, but no allowance had been made for purifiers and holders. One of the diagrams showed a plot of total costs including the allowance for capital charges compared with the total cost of coal gas in horizontal retorts as anticipated by Nicklin and Redman. These comparative costs made no allowance for capital charges on existing plant, and in view of this, their description as anticipated total costs might be misleading.

Economic Units

If their object was to make their smaller undertakings economically sound, particularly those employing the smaller set, the present price of butane must be regarded as a serious handicap. When they developed the use of butane on butane/air plants in Wales, their object was to enable them to make their small undertakings economic units.

Dr. Johnson had told them of a reduction in price, and if the cost of butane came down, then the cost of butane/air mixtures was going to come down in greater proportion than the cost of butane-enriched blue water gas.

Reference was made to the properties of propane and butane, and it was stated that the propane cylinders were designed for a working pressure of 200 and a test pressure of 600 lb. per sq. in. He sounded a word of warning that they must be careful in reading these figures that they differentiated between absolute pressures and gauge pressures. Both of them were quoted indiscriminately. The Safety Rules Committee had in course of preparation a Code of Practice for the handling and transport of butane gases, and he knew that other committees were working on this matter.

Mr. F. E. Mills (North Thames Gas Board) suggested that at Spenborough the A.T.B. Number and the Wobbe Number gave a very good indication of the performance of the appliances, without bothering with other criteria.

Mr. W. T. Hird (Wales Gas Board) said that the gas distributed at Whitland had a calorific value of 730 B.Th.U. per cu.ft., a specific gravity of 1.22, and a Wobbe Index of 664. With this mixture, the thermal delivery capacity of a system of mains was increased by about 14%. As the mains system in most small undertakings tended to be over rather than under loaded, the use of a butane or propane/air mixture would appear to have an advantage over the distribution of a gas similar in calorific value and specific gravity to normal coal gas.

The distribution of butane/air at Whitland had involved the modification of appliances. Whether the modification should be described as major was doubtful. Only in the case of very few appliances was replacement necessary, and then only because conversion burner sets were not, at that time, available. For the remainder, the modifications varied from a simple readjustment of injector and primary air supply to the re-drilling of burner parts. In future installations, the cost of this work if capitalised would represent less than 1d. per therm and it resulted in the undertaking having all appliances correctly adjusted and probably giving more satisfaction to the consumer than was general in very small undertakings.

The gas at Whitland contained 16% of oxygen, but this would appear to cause no difficulty provided the gas distributed remained dry. South Wales contained many miles of inter-colliery high pressure compressed air mains. Many of these had been in use for a considerable number of years without any excessive internal corrosion taking place.

They had also found that the normal screened joints on tubing had tended to leak when passing butane. No trouble had been experienced with butane/air. It has been suggested that taper-taper threads would not give trouble, but it had not yet been possible to test these.

Low Sulphur Content

Butane or propane/air mixtures had one very definite advantage—the low sulphur content of the mixture distributed. In the case of Whitland, the sulphur content was 0.37 grains per 100 cu.ft. The distribution of this virtually sulphur-free gas had resulted in a great decrease in appliance maintenance. In nine months of working it had not been necessary to clean any appliances. Recently, an instantaneous sink water heater, in daily use in a general stores, was dismantled for examination. The heater was to all intents and purposes as clean as the day it was installed, and was refitted without any cleaning. All who were familiar with the problems of small and remote undertakings would realise the importance of this. A further pleasing thing that they had found from this improved appliance performance in Whitland was a very healthy increase in the amount of gas used.

However, there was little doubt that the distribution of butane-enriched water gas, butane or propane air mixtures, and even of neat propane would all have their uses in different circumstances. What was important was that knowledge and experience of all alternative methods of use should be gained. Only after such knowledge had been gained would they be in a position to decide the method best suited to a particular set of requirements.

RATING OF GAS PROPERTY

ASSESSMENT of gas undertakings for rating purposes has been under consideration and, as indicated in our annual review on December 31, there have been discussions with the local authority associations. They have accepted in principle the basis proposed by the Ministry of Housing and Local Government, but they have made certain important reservations. The Ministry proposes that the total rateable value of hereditaments occupied for production and sale of gas (including showrooms and offices, but not houses) in each gas board area at March 31, 1949, should be used as the basic figure in calculating rateable value for 1951-52 and subsequent years. For each such year, the basic rateable value would be adjusted according to the number of therms sold in the gas board area in the last year but one as compared with 1948-49. Any increase or decrease would be divided by five and the result expressed as a fraction of the number of therms sold in 1948-49. The rateable value of the hereditaments in the whole gas board area would be the basic rateable value increased or decreased by a similar fraction of the basic rateable value.

The associations are willing to accept these proposed arrangements provided they are not regarded as a precedent in any other cases, and on the condition that they are reviewed at five-year intervals. They stipulate, however, that showrooms and offices (except works offices) should be excluded from the assessments under this scheme. Further, the gas industry should pay rates on the basis of actual rate poundages levied in the interval between nationalisation and the date chosen for operation of the new scheme. They suggest this date should be April 1, 1953, but would be prepared to accept April 1, 1951. Bearing in mind the general increase in gas consumption and the uncertain future of the basis of revaluation as a whole it is believed that the proposals as qualified will be acceptable to most rating authorities.

Commenting on the proposals the *Municipal Journal* says: 'One would have thought that any strictly proportionate increase or decrease in the number of therms sold over those of the basic year 1948-49 would have been reflected in the revised assessments of subsequent years. But presumably there was evidence warranting division by five of the proportionate increase or decrease to determine the increased fraction for assessment purposes. There is direct disagreement between the Ministry and the local authorities on one point. The Ministry proposes to include showrooms and offices in the scheme; the local authorities consider that all but works offices should be excluded. Further discussions should clear up this difficulty.'

Gas and Coke Manufacture at Villeneuve-la-Garenne

By P. J. SAVAGE, B.Sc., A.R.C.S.,
North Thames Gas Board

From a paper to the London and Southern Junior Gas Association

FOLLOWING nationalisation in 1946, the French gas industry was divided into eight regions, each with its own administration but subordinate to a Central National Committee in Paris. A very large amount of control was vested in this body, and the organisation set up soon suffered from over-centralisation. Senior regional officials had only a limited responsibility and had to refer back to the central body on matters of comparatively minor importance. Much of their time was spent in attending meetings and committees away from their own regions.

To meet a demand for gas that was growing at the rate of 5% per annum, a long term programme of development was evolved. The main feature of this was the proposed construction of many new coke oven batteries in addition to those already in existence. Apart from the usual economic factors, the choice of this type of gas making plant was influenced by the great need to increase the production of metallurgical coke.

This paper is chiefly an account of observations made on a visit, covering the month of August, 1951, to the coke oven works situated at Villeneuve-la-Garenne, about five miles to the north of Paris. Adjacent to Villeneuve was the works of Gennevilliers, the largest in France. Several references made to this works have been largely based on notes made by Mr. L. J. Clark after a visit to Gennevilliers in 1948.

The carbonising plant of Villeneuve consisted of six batteries of 15 ovens, each of 15 tons capacity. Five batteries were of Koppers design and one by Becker. Two of the Koppers batteries were unusual in that a large proportion of siliceous bricks was used in their construction. Marishka mechanical producers made gas chiefly for heating the ovens and, in smaller amounts, for diluting a part of the coal gas. The bulk of the latter was, however, sent direct to the Gennevilliers works, where it was diluted to a standard calorific value of 472 B.Th.U. per cu. ft. with either producer gas or carburetted water gas. The maximum production of the Villeneuve works was about 21 mill. cu. ft. per day, while that of Gennevilliers was about 40 mill. cu. ft. per day, including C.W.G.

Coal Handling Plant at Villeneuve

Coal used at Villeneuve came from three sources—America, Germany, and France itself. That coming from the first two arrived at Rouen in ocean going vessels. Here it was unloaded into barges of up to 1,200 tons capacity and carried up the River Seine to Villeneuve. Coal from the French mines was transported by rail, or by small barges of 300 tons capacity through canals to the River Seine and then as before. The average price of coal received was very high—*viz.*, about 6,100 Fr. (£6 2s.) per ton. Before the war much English coal, mostly from Durham, was used and it was held in high esteem. Unfortunately, it was no longer available.

On arrival, the barges were unloaded by three coal transporters, each with a rated capacity of 100 tons per hour. The mobile gantries of these machines spanned the entire coal stocking field, which was about 1,000 ft. long by 200 ft. wide, with a capacity of 45,000 tons, that was equivalent to four weeks' maximum consumption. Parallel to the stocking field but on the far side from the river a series of belt conveyors, served by the transporters, carried the coal towards the oven batteries.

In relation to their size and cost, the capacity of the transporters was not high, but they appeared to be much favoured in France for coal and coke handling. As regards Villeneuve, they were particularly suitable. Very many different types of coal were received and, for blending purposes at a later stage, it was necessary to keep them well separated during storage. With their overhead vision the transporter drivers were able to position themselves ideally for this purpose. The River Seine is tideless at Villeneuve and so the time factor, in unloading a barge, was not so crucial. Furthermore, small 2-ton grabs carried by the transporters, plus the overhead position of the drivers, permitted the easy removal of coal from the extremely small hatchway openings of some of the barges. Finally, the mode of operation was very simple as with the same machines coal could be fed to or from stock or on to conveyors to the works direct.

Coal was stored in heaps up to 25 ft. high and no partitions were used to separate the different grades. Very little trouble with fires was encountered; possibly this was associated with the low volatile content of much of the coal used. At Gennevilliers it was possible to store about 35,000 tons of coal, in a water filled reinforced concrete base, in heaps up to about 35 ft. high.

Railborne Coal

Railborne coal was brought into the works in bottom discharge wagons, from which it was dropped into small dumping hoppers leading on to a belt conveyor to the works. There were no facilities for directing this coal into stock except in limited amounts to the blending hoppers. At the time of visiting Villeneuve these hoppers were being reconstructed to accommodate wagons of no less than 60 tons capacity. Apparently these were now being used extensively on the French railways and, economically, they were a much better proposition than the smaller British wagons.

On leaving the dumping hoppers, the railborne coal passed through toothed roller crushers before joining the main system which carried similarly crushed coal from the barges and stock field. From here, the coal was elevated to two shuttle belts located above 16 blending hoppers. These were laid out in two parallel rows of eight, and they had a total capacity of some 6,000 tons.

The coaling system up to this point was controlled from a small room beneath these hoppers. The entire layout was represented diagramatically on a panel, and small lights indicated the working of the various units, which could be started by push-buttons alongside. Another series of lights showed the position of the shuttle-belt carriages above the hoppers and also the direction in which the belts were turning. To move a carriage to a particular hopper the appropriately numbered button was pressed. This started a motor on the floor beside the carriage and, through a series of cables and pulleys, moved the latter in the desired direction. Upon reaching the correct position the carriage was automatically halted and the corresponding indicator light illuminated below. All units as far back as the coal stocking field were interlocked in sequence, and the failure of any one of them brought the

(*Continued on page 276*)

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whole plant to a standstill. Various other safeguards were employed to ensure the smooth working of the system. Thus, as a hopper was filled the peak of the coal within it forced a suitably located flap upwards so as to operate a 'cut-out' switch. Similar devices were fitted to vital junction chutes, etc.

Coal was fed from the blending hoppers by 'shaker' plates. The discharge rate was controlled by adjusting the position of the crankpin in a slot in the eccentric drive. Hammer mills which reduced the coal size to approximately 80% < 4 mm. were located after the blending hoppers, with the result that the dust nuisance in the latter was much reduced. Coal leaving the hammer mills passed through two mixers, each of which consisted of two sets of inter-rotating blades contained within a cylindrical shell about 12 ft. long.

The belt conveyor from the hammer mills to the battery coal towers was very steeply inclined. In winter trouble had arisen due to slipping of the belt caused by the formation of ice on the head pulley. To overcome this a small blower was used to pass air, warmed by a steam heater, up through the structure enclosing the conveyor.

Two coal bunkers situated side by side above the batteries had a total capacity of 3,300 tons—almost two days' supply under full winter load. A combination of static and motor propelled rotating chutes was used to fill these hoppers evenly. The rotating chutes were remote controlled from below and, once again, flap switches were used to prevent the overfilling of any part of the hopper. As a further precaution the chutes were lined with brass sheeting to ensure easy flow of the coal.

In addition to the system described above, various other plant was available in emergency. This was laid out so that, in the event of almost any breakdown on the main system, coaling could proceed by an alternative route.

The majority of conveyor belts at Villeneuve ran on self-lubricating idlers, and it was noticeable how these were almost invariably used in sets of three with the centre idler rather longer than the two outside ones. This arrangement proved very satisfactory in practice.

Coke Oven Batteries

As stated previously, there were six batteries of 15 ovens each at Villeneuve. The single Becker battery was constructed in 1929 but apparently held in reserve until the late 1930's. Of the five Koppers batteries three were built partly under German control, in the early war years, and they were very similar in design to the present batteries at Beckton. The remaining two Koppers batteries, which were constructed on the free expansion principle, were completed in December, 1949, and December, 1950, respectively.

Due to the extreme shortage of silica bricks on the Continent at that time their use had to be kept to a minimum. In fact, the only parts of these two batteries which were built of silica brick were the oven chambers themselves and the surrounding combustion flues. The top of each battery, plus the entire structure below the ovens, including the regenerators, was constructed in siliceous brickwork. To accommodate the greater expansion of the silica works in relation to the siliceous, it was necessary to incorporate a series of sliding and expansion joints at various places in the batteries. For instance, between every pair of heating flues there was an expansion joint 4 mm. in width. These joints did not, however, represent the whole of the differential expansion. As a result a small movement took place after the expansion joints had closed, along the sliding joints, which were inserted at the boundaries of the silica and siliceous brickwork. It was therefore necessary to make the overall width of the silica brickwork slightly less than that of the siliceous portion so that the sides of the battery would be flush with the buckstays when it was at working temperature.

One peculiarity of the free expansion batteries was that each oven was linked to its neighbour through the expansion joints placed between the alternate combustion flues. Theoretically, if after heating up the battery the joints did not close, it was possible for gas made in any one oven to pass into any other. In practice any remaining fissures were soon filled with scurf and it was only after considerable heat fluctuations, due to change in the carbonisation period, or if an oven was left empty for a time, that any leakage took place. Even then leakage was of negligible proportions.

The inclusion of the expansion joints involved a modification in the brickwork which resulted in a reduction in the number of heating flues alongside each oven from 26 to 24 (as compared with an all-silica oven of the same length). This did not appear to affect the heating of the free expansion ovens in any substantial way.

One advantage claimed for this type of battery was that it would be possible to let it down cold without suffering any serious damage. This had not yet been tried on a large scale. As regards capital cost, it was found that savings made in the use of the cheaper siliceous bricks were just about balanced by the extra expense involved in the construction of the batteries.

It was too early to say with certainty whether this type of battery would be adversely affected by the unusual features of its construction, but up to August, 1951, indications were that it would be very satisfactory. No complications had arisen during the initial heating up of the batteries, and thermal yields from the coal carbonised since have been high.

Battery Ironwork and Ancillary Plant

All the ovens had twin offtakes and four charging holes. Correspondingly the coal car was subdivided into four conical sections, each of which was surmounted by a measuring cylinder. This appeared to be a distinct advantage over the three-hole system, and good level charges were obtained without difficulty. No special procedure was adopted when charging an oven, and the contents of the four pockets of the coal car were not dropped in any particular order. No steam ejectors were fixed into the offtake pipes to prevent dust emission when charging.

A heavy plate dragged to and fro by chains was used to keep the collecting mains free of thick tar. At Gennevilliers the foul gas mains were arched in rather an unusual way above the batteries to make them self-supporting over a wide span.

Oven doors were tightened to their frames by eccentric clasps. An elongated hook was provided at the top of each of the doors, making it possible to hang them free of side supports when under repair, a small stool steadying the door at its base. The sealing strips were of two types at Villeneuve. One had a rounded face convex with respect to the frame and the other a double knife edge. The former was preferred on account of its greater strength. At Gennevilliers Wolff type sealing strips were used. Leakage from doors at both works was very slight

Door linings were cast *in situ* from a mixture of ciment fondu (1 part) and grog (3 parts). The mortar was shaped by special forming plates bolted into the channels that normally held the sealing strips. An expansion joint about a quarter of an inch wide bisected the lining across its width. The average life of this type of lining was three to four years, and from appearances it stood up to working conditions very well indeed.

Of three dischargers, one possessed a slewing door extractor which lined up with the ram. This was considered to be a big advantage over the older non-slewing type. Less time was taken to discharge an oven and, furthermore, doors could be swung well away from the side of the battery, making it easier and more comfortable for the workmen to clean them down.

While whistle signalling was used to control the discharging process at Gennevilliers, the Villeneuve system relied upon vocal communication between the men on top of the batteries and those at the sides, below. This had so far proved sufficient.

The coke wharves were surfaced with cast iron tiles about 15 in. square and 1 in. thick. These were very successful and

(*Continued on page 278*)

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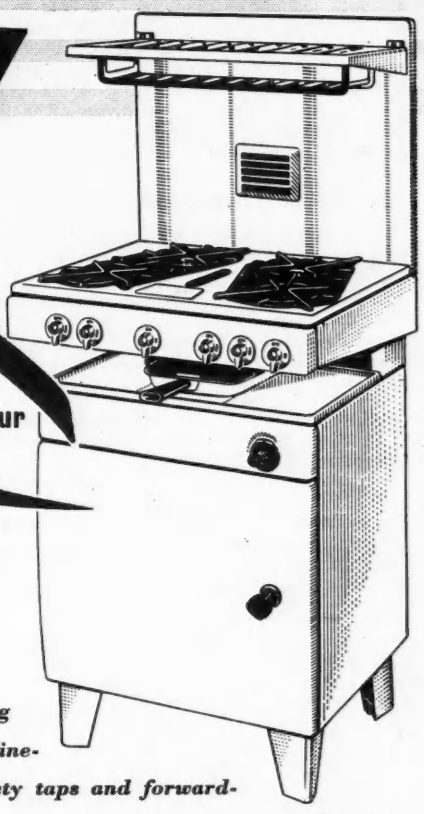

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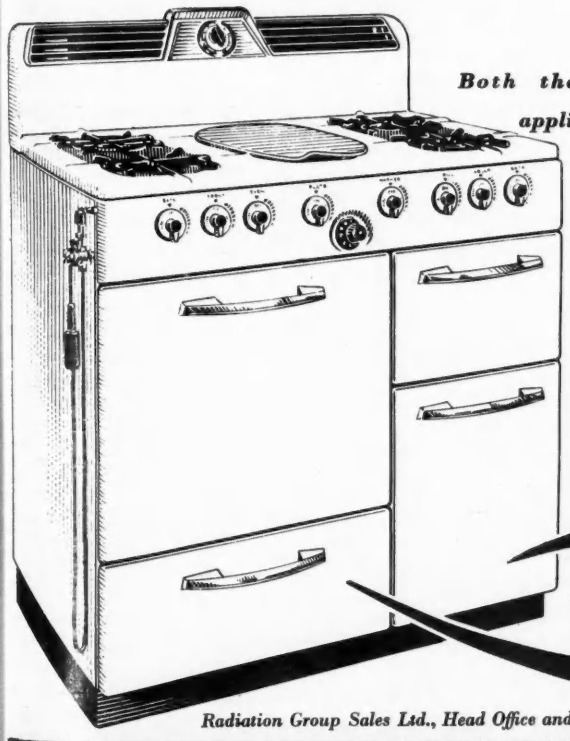

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usually had a very long life, but compared with the more usual blue bricks the capital cost must have been rather high.

Quenching towers, one at each end of the block of six batteries, were only about 55 ft. high. The discharge valves on their water tanks were motorised and could be operated by push-buttons from the cab of the electric locomotive which propelled the coke car. An extended platform on the latter made it possible to shunt the coke car to and fro beneath the quenching tower to give better distribution of the water in the coke without drenching the locomotive. The quenching water was used at the rate of 1.6 tons per ton of coke, and it was claimed that the moisture in the large coke was only 4-5%. At Gennevilliers, worthless phenolic residues were often disposed of by spraying on the hot coke before the quenching proper with water.

Temperature Control and Carbonisation

As a means of balancing production against consumption at Villeneuve, it was common practice to switch from producer gas to rich gas firing and *vice versa*. The carbonisation period was also varied over wide limits. In summer this was often as much as 30 hours, while in winter it was usual practice, since the construction of a new coke plant in 1951, to reduce this period to 18 hours.

Control of temperatures was done externally, and gas distribution across the battery was regulated by fixed nostril plugs at the base of the combustion flues. Very little scurf was formed in the Koppers ovens. This was, in part, due to the low volatile content of the coal mixtures carbonised—*i.e.*, about 24% V.M., but, in addition, direct heating of the ovens was maintained below the coal level by practically shutting the dampers at the top of the combustion flues after the initial heating up of the battery. More scurf was formed in the Becker ovens due to overheating from the top cross-over flues.

For a 24-hour carbonisation period middle row temperatures averaged about 1,240°C. and outside rows 1,190°C. (The average width of the ovens was 15.9 in.). The fuel consumption of the Koppers batteries was approximately 10.9%. In the Becker battery this figure was about 20% higher; a very considerable difference.

As regards gasmaking, thermal yields which amounted to 60-62 therms per ton, were much affected by the low volatile content of the coal mixtures carbonised. In the French coals this was often as low as 18-20%, but it was general practice to blend these with the richer German and American coals to give an average figure of 24%.

The calorific value of the gas made was about 520 B.Th.U. per cu. ft., this being obtained by maintaining a pressure of about 16/100 in. W.G. on the assembly mains. Two Arca governors were used for this purpose, but they were situated in the exhauster room about 80 yards from the batteries, and governing through the long impulse pipes was not very good. The turbo-exhausters were driven by both A.C. and D.C. motors.

Producer Gas Plant

This plant consisted of 12 identical Marishka mechanical producers with a further four similar units under construction. Each had a generator with an internal diameter of 6 ft. 9 in. which gives a fuel bed area of 35.8 sq. ft. For economic reasons three grades of coke were gasified—*i.e.*, 10-20, 20-30, 30-50 mm.—and consumption, according to the grade used, was about 16, 22, or 24 tons per day. This corresponded to a daily production of respectively 2¼, 3, or 3½ mill. cu. ft. of producer gas with a calorific value of 135 B.Th.U. per cu. ft.

The producers were of the older Marishka type, each having an annular water jacket boiler surmounted by a double ring of boiler tubes 24 in. long and internal diameter 3½ in. Saturated steam was generated at a pressure of 110 lb. per sq. in.

The blast pressure beneath the grates was usually maintained at 5 in. W.G., the air being saturated with water vapour at a temperature of 53°C. to 58°C. To provide the necessary proportion of vapour, the air was first passed through saturators supplied with warm water that had previously been used for cooling purposes in the coal gas primary condensers. Consequently the amount of steam necessary to raise the blast temperature to the correct figure was reduced and a considerable recovery of the sensible heat in the crude coal gas was effected.

The water sealed grates revolved on what were virtually large ball bearings. Unfortunately, these were enclosed and it was not possible to observe their efficiency but, as in this country, there has been a tendency in recent years to favour flat metal skids.

At Gennevilliers there were, in addition to those described above, more modern types of Marishka producer. In these the annular boiler was replaced by a jacket of tubes which abutted closely to one another except at the top 3 ft., where the diameter of the tubes was reduced to leave exit gaps, between adjacent tubes, for the hot producer gas. The crevices between the lower parts of the tubes were filled by curved plates, welded into position, so as to form a continuous wall to prevent ash lodgment and corrosion. Curved superheater tubes surrounded the boiler tubes in the upper zone and steam was raised at a pressure of 200 lb. per sq. in. and a temperature of 320°C. at the rate of 1 lb. per lb. of coke gasified.

In still later models, recently constructed, the superheater, together with an economiser, was contained in a separate chamber which was situated in the hot gas outlet of the producer and fitted with a dust trap and discharge valve.

The grates were also modified, and the older type grate, which in shape was like an equilateral triangle with rounded sides, having an eccentricity of 4 in., was replaced by a concentric tower-shaped grate with tuyere plates. With this type, ash extraction was aided by curved radial arms and a water cooled belt was provided in the ash crushing zone.

Producer Fuel Supply

One of the most interesting features of the Villeneuve producer plant was the method employed to supply the producers with fuel. The coke hoppers were contained in a separate building parallel to that containing the producers, and coke was carried from the former by an overhead skip travelling on a monorail.

When an operator determined by the regular sounding of a fire that a certain producer needed charging, he simply had to press two numbered buttons on a central control panel. The first of these indicated the producer in question and the second selected the hopper in the adjacent building from which he wished to take coke.

The opening and closing of the coke hopper slides, water sealed door, and cone valve were effected by the stroke of a double-acting piston operated by compressed air. Small pilot solenoid valves admitted air on to the piston faces. The solenoid valves were activated or deactivated by switches placed either on the skip track or on the piston rods.

As stated previously, the operator 'sounded' the fire at frequent intervals to determine the fuel needs. Similarly, every two hours pokers were pushed on to the grate cap and into the annulus to ascertain the clinker conditions. In the four producers under construction it was hoped to do away with the need for both these operations. A prolonged experiment carried out in a single producer over a period of several months has shown this to be a practical proposition.

For the charging of the producer the controlling factor was the pressure drop from a point within the fire to a point in the gas space well above the coke level. In the test producer three manometers of the ring balance type were used. One of them measured the pressure drop from a point corre-

(*Continued on p. 280*)

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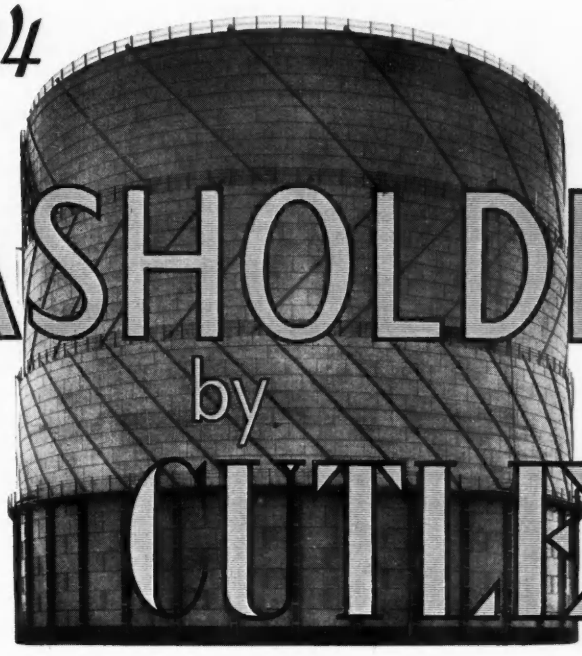

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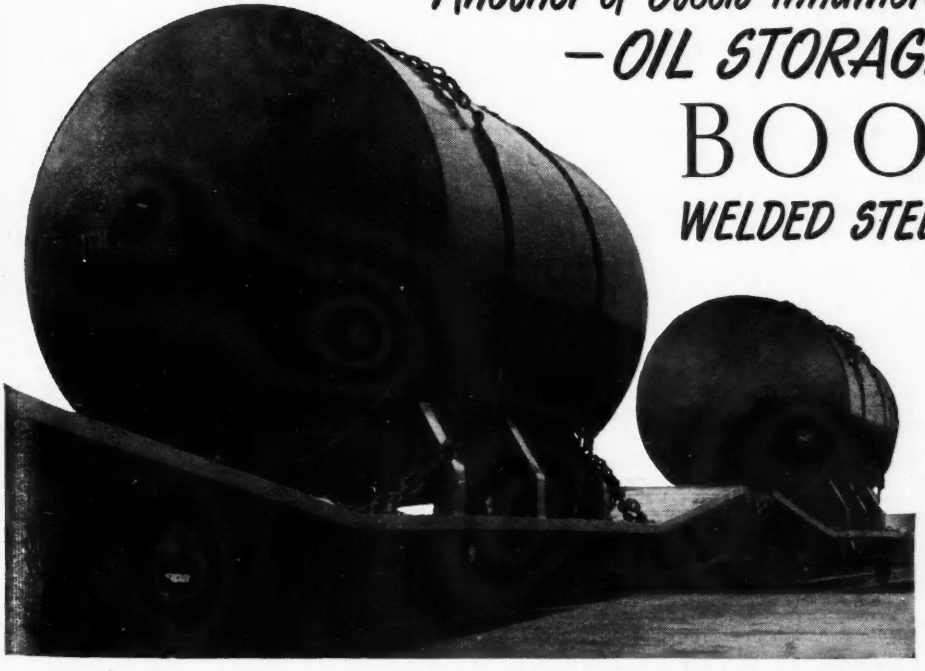

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sponding to the desired lower working level of the fire to a point in the gas space at the top of the generator. Contacts on the manometer ring were arranged so that when its bottom impulse tube became uncovered and the pressure differential zero—*i.e.*, when the fire required charging—a circuit was closed which, through a relay, started the coke skip on the cycle of operations described previously. If, through a fault developing in the charging system, the fire dropped well below the normal working level, then the lower impulse pipe of the second manometer was uncovered. This, functioning in the same way as the first instrument, set off an alarm bell. The third manometer operated a 'too high' alarm in a similar fashion.

A producer gasholder was normally used at Villeneuve, but for part of the time of this experiment it was not available. While this was so it was arranged automatically to slow down the production of producer gas during the inversion period on the batteries. This, of course, drastically reduced the pressure drop across the producer and could have upset the automatic system. To prevent overcharging, a 40-sec. delayed-action switch was connected into the coke skip starter circuit and similarly a 5-min. delay was incorporated in the alarm circuit.

The principle of the automatic clinkering process was to work the grate motor intermittently according to the temperature immediately above the grate cap. Two thermocouples contained within a composite copper-steel tube were passed up through the centre of the producer grate so that their 'hot' junctions protruded above the grate cap. A stainless steel protector screwed into the cap prevented erosion of the copper tube within. The leads of the thermocouples, which were taken out through the base of the grate, were separated from one another by steatite insulators.

The temperature indicated by one of the thermocouples was registered on an instrument of the galvanometer type. The pointer arm of this instrument carried two contacts which, through a relay, switched the grate motor in and out of circuit. These contacts were set so that the grate motor started at a registered temperature of 70°C. and stopped at 80°C. A similar instrument operated an alarm bell. In this case the upper and lower limits were 62°C. and 150°C. respectively. By this method the temperature above the grate was kept constant within close limits, and ideal clinker conditions were maintained. At the beginning of the experiment the fire was 'dipped' at regular intervals but it was found that when the poker pierced the clinker on the grate cap, temperatures rose locally and provoked a prolonged stoppage of the grate motor. As a result, fire inspections were progressively reduced and finally abolished. It was found that the safeguards provided by the automatic control were quite adequate.

Encouraging Results

The results obtained with the test producer were so encouraging that it was considered that the automatic methods employed for both charging and clinkering could be economically applied to a whole plant. This has led to their application to the four new producers and, in due course, to the 12 existing producers.

Gas leaving the producer plant was partially cleaned in scrubbers, of which there was one to each generator. These scrubbers contained only a small amount of wooden grid packing. From there, the gas was pumped to the batteries and relief holder by six Theisen exhausters.

This type of exhauster is designed to clean the gas it pumps. Several concentric rings of small vanes are fixed close to the centre of the impeller and are interspersed with several more rings attached to the impeller casing. A constant supply of water enters both sides of the casing at a point just above the vanes. Twin gas inlets are situated opposite the vanes so that when gas enters the exhauster violent turbulence is set up between those fixed to the casing and those attached to the impeller. The result is that particles of fine tar fog and any remaining dust become loaded with drops of water, which are then thrown against the inside of the casing by the main impeller blades. Any drops of water remaining in the gas are extracted by coke filters placed, in steel vessels, on the outlet of each exhauster. Results obtained with these machines have been mostly satisfactory and no trouble has been experienced on the batteries due to dirty producer gas. Unfortunately, the power consumption per unit of gas pumped has been rather high.

The manning of the producers varied according to the number of sets in use but, on winter load, with, say, 10 producers working, five men, including a foreman, were necessary to run the entire plant plus the ancillaries.

Purification of the Coal Gas

This was fairly conventional. Two groups, each of four vertical tube condensers, with a cooling surface of 12,000 sq. ft., were used to cool the whole of the coal gas. There were no secondary condensers or detarrers on the outlet of the exhausters.

Two groups of three static scrubbers working in series were used for ammonia washing. Of the three scrubbers in each group the first two had wooden grid packing but in the third this was absent and a series of sprays injected the washing liquor into the gas space. Residual liquor of about 0.7 oz. strength, from a concentrated ammoniacal liquor plant, was used as the washing medium. A battery of pumps recirculated this in backward rotation through the scrubbers. The strength of the final liquor was only about 9 oz.

As regards oxide purifiers, there were four sets of four two-layer divergent flow boxes with a capacity of 3½ mill. cu. ft. per day per set and an 'R' ratio of 30.5. In addition, there was a further set of double this capacity with four-layer boxes, and finally a catch box. One large building contained the 21 boxes, in all, which were laid out in one long line, plus the oxide handling plant that was alongside.

Three overhead travelling cranes were able to traverse the whole building but, to avoid a central row of roof supports between the oxide space and the boxes, it was necessary for the monorail and collector strips of each crane to be divided into three parts. The smaller central portion acted as a bridge piece between the other two and, being carried on one of them, could be easily swivelled into position, as desired. This arrangement made it possible to discharge or charge a box direct to or from the storage space. Alternatively, the individual sections of the cranes, working separately, could be used for shifting oxide or box covers along the building. The whole layout was very impressive in its simplicity and compactness.

The process of charging the oxide in a box usually took about a week and involved one crane driver plus four other men. The oxide in the boxes was laid on wooden planks (3 ft. 6 in. × 1 ft. 6 in. × 1½ in.) which were drilled with numerous holes tapering in diameter from ½ in. to 1 in. These were apparently quite successful and normally lasted two to three years. The oxide layers were about 2 ft. 4 in. thick. No excessive caking was observed in a box about to be discharged. Rubber sealing strips were used between the lids and boxes and the joint faces of the latter were carefully preserved by wiping with a benzole soaked rag and dusting with talc powder before a lid was replaced.

The oxide used was apparently in the form of Fe_3O_4, and was a by-product of an aniline manufacturing process in a nearby factory. Due to the dense nature of the material a large proportion of sawdust was added before it was used in the boxes. The make-up of a fresh charge, which usually contained about 12% of sulphur, was as follows:—

	By Volume	Density	By Weight
New oxide	30	1.83	64.3
Part spent oxide	5	1.03	6.0
Sawdust	65	0.39	29.7

The oxide was worked up to a sulphur content of 42-45% and this was only achieved after the oxide had entered the box five to six times. Even then this sulphur figure was not always obtained and oxide was sometimes finally discharged with a sulphur content well below 40%. Except for the

fraction removed to allow for volume expansion due to sulphur absorption, each charge was kept separate from the other oxide. Typical working up figures were:—

	S(%)	N_2(%)	CN(%)
Entering box for 1st time	13.0	2.7	1.7
2nd time	25.2	3.7	2.4
3rd time	30.6	4.7	4.0
4th time	40.0	5.2	4.4
5th time	46.7	6.5	—

For continuous revivification in the boxes, air was pumped into the gas stream, by a Roots blower, at the rate of 2.5% of the volume of gas passed.

Benzole Extraction

Benole extraction was performed by three groups each of three oil washing towers. The crude benzole obtained by the continuous distillation of the benzolised oil, in vacua, was further distilled in batches.

The concentrated ammoniacal liquor plant was in three units, similar in construction but of different capacities—viz., 41,000, 82,000, and 103,000 gal. of 9 oz. liquor per day. The concentrated liquor produced had a strength of 120-130 oz. free ammonia and the residual liquor was reduced in ammonia content to about 0.7 oz.

Coke Handling

There was nothing very unusual in the coke handling and screening methods. The large coke above 100 mm. (>4 in.) was removed by Grizzly type screens and, usually, loaded direct into rail wagons, to be used in blast furnaces, etc. The remainder was passed on to two-tier Chapuis and three-tier Yerneaux screens which were of the resonance type and worked at speeds of 900 and 1,100 vibrations per min. In the new coke plant, Dragon screens were installed. Large coke could be cut to smaller sizes if required.

There was not a great deal of sack trade in coke at Villeneuve and in what there was coke was sold by the sack and not by weight. The sacks were filled on an enclosed platform about 12 ft. above ground level and were then dropped down buffered chutes to the loading gangs on the lorries. In this way atmospheric pollution was kept at a minimum. Furthermore the one man out of each gang who worked on the filling platform was protected from dust by extractor hoods which were fitted over each hopper outlet.

At Genevilliers, on the other hand, the question of sack trade appears to have been taken rather more seriously. A new plant recently installed has been designed to weigh coke into sacks (50 kilos. in each = 110 lb.) with an accuracy of less than 1/200 of the declared weight or not more than the weight of the largest lump of coke, whichever is the greater. It remains to be seen whether this extremely high standard can be obtained in practice and, indeed, the method employed suffered from the disadvantage that it took 18 secs. to fill one sack. At the same time, by the use of a mechanical device to hold the sacks beneath the weigh hoppers and, following this, a series of conveyors to carry them to the loading points, all manhandling of the loaded sacks was abolished.

Steam and Power

The consumption of high pressure steam was comparatively small. This was, in the first place, due to the fact that all electricity consumed at Villeneuve was imported from outside sources. In addition, no steam turbines and only very few steam pumps were used. The production of high pressure steam in the Marishka producer boilers further reduced the extra quantity necessary to balance the works load. In fact, three Stirling boilers with Babcock chain grates, having a total capacity of about 30,000 lb. of steam per hour, were more than ample for this task.

Two independent sources of supply, in the form of 15,000 volt A.C. and 5,500 volt A.C., provided electricity. The first of these, stepped down by transformer to 380 volt A.C., was used for constant speed motors on the air blowers, some exhausters, and on the more modern coke plant. A gradual transfer of much other plant to this source was envisaged. Smaller quantities of electricity from this supply were also used in the form of 220, 110 volt A.C. for lighting and for the producer house automatic controls. The 5,500 volt A.C. supply, transformed and rectified to 500 volt D.C., provided power for the coal transporters, battery ancillary plant, etc., and also for those exhausters which were standby to the A.C. machines.

The precautions taken to protect the workmen were of a very much lower standard than those generally adhered to in this country. To give a few instances, motor couplings were seldom covered and unguarded cable drums and transmission shafts were common. Remotely controlled plant often seemed to start without warning. Inlet and outlet purifier valves were not logged with water prior to discharge of a box.

Labour

As in England, there was a definite shortage of labour of all kinds, but a realistic approach to the question of wages reduced this to some extent. On entering the gas industry the French workman received a comparatively small wage for the first two years of his service. At the end of this time, however, his wages were raised somewhat and brought within a scheme which not only took account of his position but also his length of service. Normally his wages were increased slightly each year thereafter, even if he continued to do the same work, until he finally retired at the age of 55. The gradual increase of this remuneration, plus the early retirement age, tended to encourage long service and so reduce wastage in the most experienced manpower. One feature of this scheme which was perhaps disadvantageous was that the position sometimes arose where the older working men received more than their foreman, in spite of the different gradings of their salaries. Both engineering and office staff were also paid according to the same scheme but at higher grades. The engineers could retire at the age of 55 if they wished and the office staff at 60.

It was not easy to estimate the relations between staff and men but on the whole it did appear that a rather more friendly attitude existed between the two than is sometimes found in England. It was not unusual to see a French workman remove his hat on meeting an engineer, who usually greeted him, according to French custom, with a shake of the hand. At the same time, stoppages of work due to labour disputes were not uncommon; presumably the political influence played an even greater part in these than it does here.

Conclusion

The most striking feature of the French gas industry, as exemplified at Villeneuve, was the wide application of automatic methods to control the plant used. This was not the sequel to any outstanding new discoveries but rather the result of a difference in attitude in those responsible for running the plant. Emphasis was placed on the need for saving labour even, sometimes, at the cost of damage to machinery which might not have occurred if supervision had been more adequate. This view was probably enhanced by the lower standards of safety that were considered necessary to protect the French workmen. Furthermore, the French engineers, as a whole, seemed to possess a greater natural inclination towards the highly technical plant involved in automatic controls.

At the same time, however, the French workmen often resisted labour reductions when existing plants were modernised. In such cases it was only possible to justify the extra expense involved on grounds of increased operating efficiency.

It might be thought that the necessary maintenance on such plant was excessive, but it was claimed that this was not so. To all appearances, the amount of emergency repair work required did not appear to be any greater than is usual on an English works.

On the production side, efficiency appeared to be reasonably high, though as regards purification there seemed to be little that was outstanding. In all departments the standard of workmanship was quite impressive.